



Department of
Design and
Construction

PROJECT ID:

F175RES2

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:

New Construction of FDNY Firehouse for Rescue 2

LOCATION:
BOROUGH:
CITY OF NEW YORK

1815 Sterling Place
Brooklyn, 11233

CONTRACT NO. 1

GENERAL CONSTRUCTION WORK

FDNY

Studio Gang Architects



Date:

October 16, 2015

18-042
16-042



May 25, 2016

CERTIFIED MAIL - RETURN RECEIPT REQUEST

ZHL GROUP, INC.
2383 McDonald Ave.
Brooklyn, NY 11223

RE: FMS ID: F175RES2
E-PIN: 85016B0048001
DDC PIN: 8502016FI0002C
NEW CONSTRUCTION OF FDNY FIREHOUSE
FOR RESCUE 2
NOTICE OF AWARD

Dear Contractor:

You are hereby awarded the above referenced contract based upon your bid in the amount of \$25,123,159.08 submitted at the bid opening on January 14, 2016. 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.



Department of
Design and
Construction

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,

A handwritten signature in black ink that reads 'Lorraine Holley'. The signature is written in a cursive, flowing style.

Lorraine Holley

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

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

PROJECT ID: F175RES2

**New Construction of FDNY Firehouse for Rescue 2
1815 Sterling Place
Brooklyn, 11233**

Name of Bidder: Z H L Group, INC

Date of Bid Opening: Januray 14, 2016

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

Place of Business of Bidder: 2383 McDonald Avenue, Brooklyn, NY 11223

Bidder's Telephone Number: 718-331-2807 Bidder's Fax Number: 718-331-2808

Bidder's Email Address: zh1@zhigroup.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: Yevgeniy Lvovskiy 389 Colon Street, Staten Island, NY 10312

Name and Home Address of Secretary: Yevgeniy Lvovskiy 389 Colon Street, Staten Island, NY 10312

Name and Home Address of Treasurer: Yevgeniy Lvovskiy 389 Colon Street, Staten Island, NY 10312

BID FORM

PROJECT ID: F175RES2

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
Material Sold and
Delivered

Total Price For
Labor

\$ 9,987,591.23 +

\$ 14,981,386.84

Total Price for Item A= \$ 24,968,978.08

B. **AMOUNT** for Proprietary Items (pages 2a)

\$ 154,181.00

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

\$ 25,123,159.08

BB 1/14/16

BIDDER'S SIGNATURE AND AFFIDAVIT

- ★ **SUBCONTRACTOR IDENTIFICATION:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (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

Bidder: Z H L Group, INC

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 (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:

Yevgeniy Lvovskiy

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 389 Colon Street, Staten Island, NY 10312

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
14 day of Jan, 2016

Notary Public

MARIA KIM
NOTARY PUBLIC-STATE OF NEW YORK
No. 01K16208783
Qualified in Kings County
My Commission Expires July 13, 2017

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: Z H L Group, INC
Address: 2383 McDonald Avenue
City: Brooklyn State: New York Zip Code: 11223

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

57-1155659

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.

Qualification Form

Project ID: F175RES2

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: ZHL Group, INC

Name of Project: Apparatus floor replacement at LC 3

Location of Project: 108 East 13th Street, Manhattan, NY

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

Name: Mr. Paul DeRocchis

Title: Deputy Director FDNY Phone Number: 718-389-0618

Brief description of work completed: Apparatus floor replacement, repairs to on the 2nd floor and kitchen

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

Amount of Contract: \$1,487,277

Date of Completion: August 2014

Name of Contractor: ZHL Group, INC

Name of Project: Apparatus floor replacement at EC 89

Location of Project: 108 East 13th Street, Manhattan, NY

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

Name: Mr. Shrikant Kalantri

Title: Project Manager FDNY Phone Number: _____

Brief description of work completed: Apparatus floor replacement, repairs to on the 2nd floor and kitchen

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

Amount of Contract: \$1,375,000

Date of Completion: June 2014

Qualification Form

Project ID: F175RES2

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: Z H L Group, INC

Name of Project: Shanti Tower

Location of Project: 37-34 29th Street, Long Island, City, NY

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

Name: Philip Toscano

Title: Project Architect

Phone Number: 718-349-3350

Brief description of work completed: New construction of 7-story apartment building.
Ground up construction. Total building area 25,000 sq. ft.

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

Amount of Contract: \$7,200,000

Date of Completion: 11/2011

Name of Contractor: Z H L Group, INC

Name of Project: 1178 Anderson Avenue & 1853 Anthony Avenue

Location of Project: 1178 Anderson Avenue, Bronx, NY 1853 Anthony Avenue, Bronx, NY

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

Name: Hercules Argyriou

Title: Owner

Phone Number: 718-932-6342

Brief description of work completed: New construction of 2 buildings. 1178 Anderson avenue - 20,000
sq. ft apartment building with cellar and sub cellar; 1853 Anthony Avenue - 35,000 building with the cellar.

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

Amount of Contract: 7,500,000

Date of Completion: 5/2011

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
FDNY EC 65 Replacem Apparatus Floor New York NY 10001	Prime GC	1,318,988.17	3/8/2013	Paul Dumas 516 587 7362	Fletcher Thompson Architecture 212-695-4767
FDNY EC 80 Replacem Apparatus Floor Bronx NY 10465	Prime GC	1,914,699.70	8/19/2014	Shikant Calantri 929-210-1347	Fletcher Thompson Architecture 212-695-4767
FDNY EC 151 Replacem Apparatus Floor Staten Island NY 10304	Prime GC	1,546,400.82	6/23/2014	Shikant Calantri 929-210-1347	Fletcher Thompson Architecture 212-695-4767
FDNY ladder 3 Replacem Apparatus Floor New York NY 10003	Prime GC	2,014,250.36	7/30/2014	Shikant Calantri 929-210-1347	Fletcher Thompson Architecture 212-695-4767
FDNY EC 162 Replacem Apparatus Floor Staten Island NY 10308	Prime GC	1,517,971.66	6/30/2014	Walter Blum 516 492 0782	Fletcher Thompson Architecture 212-695-4767
FDNY EC 212 Replacem Apparatus Floor Brooklyn NY 11209	Prime GC	1,695,059.81	7/12/2014	Walter Blum 516 492 0782	Fletcher Thompson Architecture 212-695-4767
FDNY FDOC SS Staten Island NY 10314	Prime GC	4,298,520.34	3/28/2014	Terry Woods 917-681-5678	Fletcher Thompson Architecture 212-695-4767

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
Q387 Pe-K Center Renovations Queens, NY 11429	Prime GC	4,898,927.00	1,000,000	1,000,000	6/15/15	David Komar 917-391-6755	MD S. Zuckerman 212-352-3307
FIDNY EC 313 Bathroom Renov. Queens, NY 11363	Prime GC	787,174.91	450,000	300,000	8/15/15	Shrikant Lalantia 929-210-1347	Cameron Engineering 516-827-4900
FIDNY EC 308 Bathroom Renov. Queens, NY 11419	Prime GC	780,941.71	450,000	300,000	8/15/15	Shrikant Lalantia 929-210-1347	Cameron Engineering 516-827-4900
FIDNY EC 308 Roofing Queens, NY 11419	Prime GC	634,293.72	300,000	400,000	8/15/15	Shrikant Lalantia 929-210-1347	
206 E 75 St New York, NY 10021	Prime GC	1,460,180.00	700,000	50,000	5/15/15	Thomas Corp	GA Architect 347-577-5945
FDNY EMS Training Academy - Bld 325 Queens, NY 1	Prime GC	3,108,011.77	1,000,000	400,000	7/15/15	Surpreet Singh Trans 347-672-5287	ZProekt Architecture 718-934-2322

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

Project ID: F175RES2

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:**

Description of Plumbing Work:

VITAL Plumbing Inc.
(Print Name)

Building plumbing
+ Sprinkler

Agreed amount to be paid Subcontractor: \$ 1,476,000

2. **HVAC CONTRACTOR:**

Description of HVAC Work:

ZHL Group <Self Perform>
(Print Name)

HVAC

Agreed amount to be paid Subcontractor: \$ 177,800

3. **ELECTRICAL CONTRACTOR:**

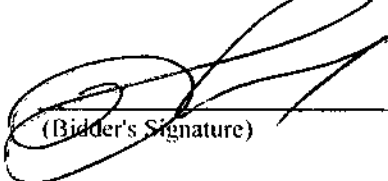
Description of Electrical Work:

Approved Electric
(Print Name)

ELECTRICAL Work

Agreed amount to be paid Subcontractor: \$ 298,300

BIDDER'S SIGNATURE: The Bidder must sign and complete this form in the spaces provided below:


(Bidder's Signature)

Yevgeniy Lvovsky
(Print Name)

2383 McDonald Avenue, Brooklyn NY 11223
(Address)

President
(Title)

7183312807
(Phone #)

7183312808
(Fax#)

1/14/16
(Date)

**Department of
Design and
Construction**

Project New Construction of FDNY Firehouse for Rescue 2
Location 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder ZHL Group

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC ID: F175RES2
DDC Sponsor Agency: FDNY

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	CONTRACT 1- GENERAL CONSTRUCTION WORK							
01-0000	GENERAL REQUIREMENTS				0		0	
01 3136	GENERAL REQUIREMENTS				0		0	
	Mobilization	1	ls	70,000.00	70,000.00	30,000.00	30,000.00	100,000.00
	Security Guards and <u>GENERAL CONDITIONS</u>	1	LS					2,638,764.35
	Subtotal							2,738,764.35
02 2000	EXISTING CONDITIONS							
02-0110	PROTECTION OF EXISTING CONDITIONS							
	Existing Conditions	2160	sf	\$ 0.75	1,620.00	\$ 6.90	14,904.00	16,524.00
	Remove existing side walk	3000	sf	\$ 1.44	4,320.00	\$ 2.88	8,640.00	12,960.00
	Saw cut and remove pavement	1	ls	\$ 5,175.00	5,175.00	\$ 2,875.00	2,875.00	8,050.00
	Misc protection							
	Subtotal							37,534.00
02-1000	PROTECTION OF EXISTING UTILITIES							
02-0110	Protection of existing utilities	1	ls	\$ 5,000.00	\$ 5,000.00	\$ -	\$ -	\$ 5,000.00
	Subtotal							5,000.00
03-0000	CONCRETE							
03-1000	CONCRETE FORMWORK (included w/section 033000)							
03 2000	CONCRETE REINFORCEMENT AND EMBEDDED ITEMS							
	included w/section 03 3000							
03 3000	CAST-IN-PLACE CONCRETE							
	CONCRETE FORMWORK (included w/section 033000)							
	24" x 24" column	8.00	ea	\$ 952.95	\$ 7,623.62	\$ 1,600.80	\$ 12,806.40	20,430.02
	10" elevator pit wall	3.70		\$ 406.74	\$ 1,839.77	\$ 1,119.74	\$ 4,147.20	5,986.97
	12" Area way wall Ext Fdn wall	29.85		\$ 658.30	\$ 19,651.52	\$ 1,068.49	\$ 31,896.47	51,547.99

**Department of
Design and
Construction**

Project New Construction of FDNY Firehouse for Rescue 2
Location 1815 Sterling Place Brooklyn, NY 11233-5007
Bidder ZHL Group

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10 F175RE62

DOC Sponsor Agency: FDNY

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
					0.00		0.00	0.00
	12" Shear wall (floor to roof)	222.89		\$ 632.32	\$ 140,938.21	\$ 639.88	\$ 142,624.67	283,562.87
	10" cip wall wall (1460sf)	44.88		\$ 585.99	\$ 26,300.01	\$ 775.21	\$ 34,792.57	61,092.59
	10" concrete slab 2 way with #5 @12 ew t&b	49.19		\$ 928.38	\$ 45,662.71	\$ 779.52	\$ 38,340.60	84,003.30
	Subtotal							506,623.75
03-3000					0.00		0.00	0.00
03-3511	Concrete Flooring Finisher				0.00		0.00	0.00
	Polished Concrete Flooring Concrete	13050	SF	\$ 3.00	\$ 39,150.00	\$ 1.65	\$ 24,142.50	63,292.50
	Clear sealer at Cellar floor	3850	SF	\$ 2.00	\$ 7,700.00	\$ 1.15	\$ 4,427.50	12,127.50
	Subtotal							75,420.00
					0.00		0.00	0.00
03-4001	PRECAST CONCRETE AMMENITIES (included w/section 034100)				0.00		0.00	0.00
					0.00		0.00	0.00
03-4100	PRECAST STRUCTURAL CONCRETE				0.00		0.00	0.00
	Column footing (F1,F2,F3)	22	CY	\$ 386.06	\$ 8,493.22	\$ 529.46	\$ 11,648.16	20,141.38
	Foundation wall footing (in fdn below)							
	Foundation and area way fig	242.00	CY	\$ 362.84	\$ 87,807.36	\$ 529.85	\$ 128,224.00	216,031.36
	Fence footing	20.78	CY	\$ 363.96	\$ 7,562.27	\$ 763.57	\$ 15,865.20	23,427.47
	Fence curb East And West property line	23.80	CY	\$ 433.97	\$ 10,326.40	\$ 758.11	\$ 18,043.09	28,371.49
	Underpinning Concrete only	21.78	CY	\$ 1,934.33	\$ 42,125.33	\$ 2,353.96	\$ 51,264.60	93,389.33
	Grout not lagging	1,960.00	sica	\$ 55.00	\$ 107,800.00	\$ 65.00	\$ 127,400.00	235,200.00
	Solder piles Grouting	65.13	CU	\$ 360.00	\$ 23,445.33	\$ 186.64	\$ 10,852.80	34,298.13
	Conc corbel at 2nd floor	2	CY	\$ 927.60	\$ 1,855.20	\$ 2,880.00	\$ 5,760.00	7,615.20
	Conc curb @insulated panels	140	LF	\$ 52.80	\$ 7,392.00	\$ 144.00	\$ 20,160.00	27,552.00
	Stair fdn	3.70	CY	\$ 496.74	\$ 1,839.77	\$ 2,091.74	\$ 7,747.20	9,586.97
	Conc curb at insulated Precast panels	54		\$ 52.80	\$ 2,851.20	\$ 144.00	\$ 7,776.00	10,627.20
								0.00
	12" Foundation wall in 03-3000				0.00		0.00	0.00
	12" DWing Wall in 03-3000				0.00		0.00	0.00
	10" wall at 3rd floor in 03-3000				0.00		0.00	0.00
	Concrete curbs under planters	88		\$ 60.00	\$ 5,280.00	\$ 200.00	\$ 17,600.00	22,880.00
					0.00		0.00	0.00
					0.00		0.00	0.00
					0.00		0.00	0.00
					0.00		0.00	0.00

Department of
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Project New Construction of FDNY Firehouse for Rescue 2
Location 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder ZHL Group

CONTRACTORS BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC ID: F175RES2
DOC Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
								0.00
	6" Concrete slab on grade	7,100.00	sf	\$ 7.74	\$ 54,966.00	\$ 10.50	\$ 74,556.00	129,522.00
	6" Concrete slab on grade with polystyrene at areaway	220.00	sf	\$ 11.00	\$ 2,420.00	\$ 11.00	\$ 2,420.00	4,840.00
	12" slab at fuel tank	252	sf	\$ 12.00	\$ 3,024.00	\$ 21.50	\$ 5,418.00	8,442.00
	Stair slab on sty 5' near high	35	sf	\$ 22.00	\$ 772.00	\$ 34.00	\$ 1,224.00	2,016.00
	11" concrete slab at gr floor to rec 3 to 5" topping incl stud rail	7,100	sf	\$ 29.54	\$ 209,712.00	\$ 43.23	\$ 306,946.80	516,658.80
								0.00
	8" hollowcore Precast to rec 2" topping	4088	sf	in precast sub				0.00
	1.5 DT20 Precast to rec 2" topping	370	sf	in precast sub				0.00
	8DT 22 Precast to rec 2" topping	2540	sf	in precast sub				0.00
	8DT24 Precast to rec 2" topping	2540	sf	in precast sub				0.00
	12" raised platform at entry lvl 2 at D/3-D/2	95	sf	\$ 18.00	\$ 1,710.00	\$ 15.00	\$ 1,425.00	3,135.00
	Polystyrene at elevator pit	5	cy	\$ 500.00	\$ 2,500.00	\$ 300.00	\$ 1,500.00	4,000.00
	1-8" raised platform at Entry Lvl 2 North	120	sf	\$ 18.00	\$ 2,160.00	\$ 14.00	\$ 1,680.00	3,840.00
	1-6" h step at SW patio	65	sf	\$ 6.00	\$ 390.00	\$ 22.00	\$ 1,430.00	1,820.00
	7" concrete pad	68	sf	\$ 14.00	\$ 952.00	\$ 18.00	\$ 1,224.00	2,176.00
	4" concrete pad	44	sf	\$ 10.00	\$ 440.00	\$ 18.00	\$ 792.00	1,232.00
	6" platform @ lvl 1 north	100	sf	\$ 6.00	\$ 600.00	\$ 22.00	\$ 2,200.00	2,800.00
	Grade beam GB1	5.65	cy	\$ 410.00	\$ 2,318.50	\$ 655.00	\$ 3,700.75	6,017.25
	Precast beams section (inverted TEE) (in precast)							0.00
	Conc beam at skylight 3B2	18.75	lf	\$ 473.60	\$ 8,879.93	\$ 1,430.94	\$ 26,830.17	35,710.10
	Beam above wing wall 2B2	12.5	lf	\$ 473.60	\$ 5,919.95	\$ 1,430.94	\$ 17,886.78	23,806.73
	Concrete to stair 1	60.00	ft ³	\$ 339.03	\$ 20,341.69	\$ 1,500.32	\$ 90,019.20	110,360.89
	Concrete to stair 3 at basement	18.00	ft ³	\$ 245.00	\$ 4,410.00	\$ 925.00	\$ 16,650.00	21,060.00
	Concrete to stair 3 21/2 flr	28.00	ft ³	\$ 245.00	\$ 6,860.00	\$ 925.00	\$ 25,900.00	32,760.00
	Misc Concrete Topping and misc dems	1.00	ls	\$ 106,367.40	\$ 106,367.40	\$ 220,006.90	\$ 220,006.90	326,373.40
	Architectural precast panels and steps	1.00	ls	\$ 995,010.00	\$ 995,010.00	\$ 1,146,210.00	\$ 1,146,210.00	2,141,220.00
	Subtotal							4,106,912.50
	21 - 3							

Department of
Design and
Construction

Project New Construction of FDNY Firehouse for Rescue 2
Location 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder ZHL Group

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10 F175RES2
DOC Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
05-0000	MASONRY							
	UNIT MASONRY							
	Masonry							
	2 hr rated CMU	11,862.40	sf	\$ 7.67	\$ 91,095.71	\$ 29.57	\$ 353,673.12	445,368.83
	3 hr rated cmu	484.00	sf	\$ 9.60	\$ 4,646.40	\$ 30.00	\$ 14,520.00	19,166.40
	Plaster	1,190.00	sf	\$ 8.40	\$ 9,996.00	\$ 25.40	\$ 31,416.00	41,412.00
	Subtotal							505,947.23
								0.00
05-0000	METALS	1.00	lb	\$ 375,508.00	\$ 375,508.00	\$ 577,885.00	\$ 577,885.00	953,393.00
05-1200	STRUCTURAL STEEL	16 TONS						0.00
	Facade Structural steel	16.00	TONS	\$ 1,500.00	\$ 24,000.00	\$ 4,500.00	\$ 72,000.00	96,000.00
	L 4x4 x 3/8 at perimeter (1/S440)	2.50	tons	\$ 1,500.00	\$ 3,750.00	\$ 3,500.00	\$ 8,750.00	12,500.00
	Plates at perimeter for above	0.25	tons	\$ 1,500.00	\$ 375.00	\$ 3,500.00	\$ 875.00	1,250.00
	Structural frame at skylights	5.20	tons	\$ 1,500.00	\$ 7,800.00	\$ 5,500.00	\$ 28,600.00	36,400.00
	Moment connections at south facade (OH Door)	12.00	ea	\$ 1,200.00	\$ 14,400.00	\$ 2,000.00	\$ 24,000.00	38,400.00
	Shear studs at cols	6.00	ea	\$ 800.00	\$ 4,800.00	\$ 4,000.00	\$ 24,000.00	28,800.00
	Terra cotta corbel frame	225.00	lf	\$ 200.00	\$ 45,000.00	\$ 850.00	\$ 191,250.00	236,250.00
	Misc str steel	1.00	lb	\$ 15,000.00	\$ 15,000.00	\$ 45,000.00	\$ 45,000.00	60,000.00
	Glvanzed framing at inco	15.00	tons	\$ 2,500.00	\$ 37,500.00	\$ 4,500.00	\$ 67,500.00	105,000.00
	Metal deck at stair	400.00	sf	\$ 3.00	\$ 1,200.00	\$ 2.00	\$ 800.00	2,000.00
	Subtotal							616,600.00
05-4000	COLD FORMED METAL FRAMING (INCLUDED W/ SECTION 051200)							
05-5000	METAL FABRICATIONS							
	Metal stair incl hand rails	55.00	ft	\$ 550.00	\$ 30,250.00	\$ 750.00	\$ 42,000.00	72,800.00
	Cat walk at level 2	72.00	sf	\$ 25.00	\$ 1,800.00	\$ 35.00	\$ 1,800.00	3,600.00
	Ladder	2.00	ea	\$ 5,000.00	\$ 10,000.00	\$ 2,400.00	\$ 4,800.00	14,800.00
	Aluminum panels at facade (In Metal and glazing sum)	1.00	lb	\$ 12,500.00	\$ 12,500.00	\$ 20,000.00	\$ 20,000.00	32,500.00

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	Metal Panels @decon	96.00	sf	\$ 22.00	\$ 2,112.00	\$ 25.00	\$ 2,400.00	4,512.00
	Bollards at South	4.00	ea	\$ 600.00	\$ 2,400.00	\$ 1,200.00	\$ 4,800.00	7,200.00
	Subtotal							102,912.00
05-5213	PIPE AND TUBE RAILINGS (FROM Misc metals)							0.00
	H rail at Training balcony	24.00	lf	\$ 250.00	\$ 6,000.00	\$ 150.00	\$ 3,600.00	9,600.00
	H rail at North/South balcony	0.00	lf	\$ -	\$ -	\$ -	\$ -	0.00
	U shaper pipe at Stair patio	0.00	ea	\$ -	\$ -	\$ -	\$ -	0.00
	Subtotal							0.00
05-5306	METAL GRATINGS AND FLOOR PLATES							
	Painted metal grating at areaway	220.00	sf	\$ 25.00	\$ 5,500.00	\$ 22.00	\$ 4,840.00	10,340.00
	Subtotal							10,340.00
06-0000	WOOD, PLASTICS AND COMPOSITES							
06-1000	Misc wood blocking	1.00	ls	\$ 12,000.00	\$ 12,000.00	\$ 15,000.00	\$ 15,000.00	27,000.00
	Subtotal							27,000.00
06-4200	INTERIOR ARCHITECTURAL WOOD WORK							
	Finish Carpentry							
	Built in wooden bench at locker room	10	ft	\$ 65.00	\$ 650.00	\$ 75.00	\$ 750.00	1,400.00
	Steel and wood work bench at first level	1.00	ls	\$ 1,200.00	\$ 1,200.00	\$ 400.00	\$ 400.00	1,600.00
	Wood shelving on top of butcher block	1.00	ls	\$ 250.00	\$ 250.00	\$ 500.00	\$ 2,500.00	2,750.00
	Mill work desk at company office 6x3 (5/A804)	6.00	lf	\$ 250.00	\$ 2,000.00	\$ 200.00	\$ 1,800.00	3,800.00
	Work table at company office 9/A804	18.00	lf	\$ 250.00	\$ 4,500.00	\$ 200.00	\$ 3,600.00	8,100.00
	Mill work niche at company office 11/A 804	20.00	lf	\$ 750.00	\$ 15,000.00	\$ 150.00	\$ 3,000.00	18,000.00
	Aded misc wood work (backing at terracotta etc)	1.00	ls	\$ 25,000.00	\$ 25,000.00	\$ 45,000.00	\$ 45,000.00	60,000.00
								0.00
		21	5					

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CONTRACT : GENERAL CONSTRUCTION WORK

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CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
07-4170	TERRACOTTA RAINSCREEN TILE CLADDING							
	Terra cotta material (Mariniaro)	1.00	sq	\$ 458,400.00	\$ 458,400.00	\$ 900,000.00	\$ 900,000.00	1,358,400.00
	Mita cuts (included in scope)	0.00	sq	\$ -	\$ -	\$ -	\$ -	-
	Rigid terra cotta tile CT2	2,205.00	sf	\$ -	\$ -	\$ -	\$ -	-
	Rigid terra cotta tile CT3	906.00	sf	\$ -	\$ -	\$ -	\$ -	-
	FDNY sign	153.00	sf	\$ -	\$ -	\$ -	\$ -	-
	Subtotal							1,358,400.00
07-5323	ETHYLENEPROPYLENE-MONOMER ROOFING EPDM							
	Membrane roofing built up roofing	5,650.00	sf	\$ 15.00	\$ 84,750.00	\$ 22.00	\$ 124,300.00	209,050.00
	Subtotal							209,050.00
07-5400	Thermoplastic Membrane roofing							
	Thermo plastic membrane roofing at stair 1	500.00	sf	\$ 14.00	\$ 7,000.00	\$ 25.00	\$ 12,500.00	19,500.00
	Subtotal							19,500.00
07-5563	Green roof assembly							
	Green roof incl pre grown sedum mat	1,608.00	sf	\$ 21.00	\$ 33,768.00	\$ 35.00	\$ 56,280.00	90,048.00
	No plant zone w/gravel @roof	1,570.00	sf	\$ 7.00	\$ 10,990.00	\$ 12.00	\$ 18,840.00	29,830.00
	Pavers ar roof	772	sf	\$ 26.00	\$ 20,072.00	\$ 42.00	\$ 32,424.00	52,496.00
	Subtotal							172,374.00
07-6200	Sheet metal flashing incl metal coping							
	Perimeter condition incl coping	350.00	lf	\$ 35.00	\$ 12,250.00	\$ 22.00	\$ 7,700.00	19,950.00
	Subtotal	0.00		\$ -	\$ -	\$ -	\$ -	-
	Subtotal							19,950.00
	21 - 7							0.00

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07-7100	Roof specialties							
	Gutters and down spout	1.00	ls	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	5,000.00
	Subtotal							5,000.00
07-7100	ROOF ACCESSORIES (included in other division)							
07-8410	Through Penetrations Firestop system (Island)							
	Firestopping	0.00		\$ -	\$ -	\$ -	\$ -	
	Spray fireproofing	3.00	trps	\$ 1,200.00	\$ 3,600.00	\$ 4,500.00	\$ 13,500.00	17,100.00
	Subtotal							17,100.00
07-9005	JOINT SEALERS (In other trades)							
	Control joints at cellar (EACH TRADE OWNS)	0.00		\$ -	\$ -	\$ -	\$ -	
	Misc caulking (BOUGHT WITH TRADES)	0.00		\$ -	\$ -	\$ -	\$ -	
	Subtotal							0.00
08-0000	OPENINGS				\$ -	\$ -	\$ -	\$ -
08-1113	HOLLOW METAL DOORS AND FRAMES							
	Single	45.00	ea	\$ 350.00	\$ 15,750.00	\$ 250.00	\$ 11,250.00	27,000.00
	3Hr rated (INCL ABOVE)	0.00		\$ -	\$ -	\$ -	\$ -	0.00
	vision glass (In glazing #)	0.00		\$ -	\$ -	\$ -	\$ -	0.00
	Double doors	2.00	ea	\$ 450.00	\$ 900.00	\$ 350.00	\$ 700.00	1,600.00
	Hardware	47.00	set	\$ 265.00	\$ 12,455.00	\$ 100.00	\$ 4,700.00	17,155.00
	Subtotal							45,755.00
08-1416	Flush wood doors							
	Single	17.00	ea	\$ 300.00	\$ 5,100.00	\$ 300.00	\$ 5,100.00	10,200.00
	vision glass (glazing)	0.00		\$ -	\$ -	\$ -	\$ -	0.00
	Double	0.00		\$ -	\$ -	\$ -	\$ -	0.00
	Subtotal							10,200.00
21 - 8								

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CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
08-6300	METAL FRAMED SKYLIGHTS							0.00
	GL4 custom laminated sealed glass units							0.00
	Subtotal							0.00
08-7100	Door hardware							0.00
	In other division 8							0.00
	Subtotal							0.00
08-8000	Glazing, (in AFI Bid number number above)							
	GL 1 (1" igu) with Ceramic frit	299	sf					
	GL 2 (1" igu) with out Ceramic frit	1592	sf					
	GL 3	61	sf					
	GL 6	63	sf					
	GL 7 1" clear insulated	389	sf					
	GL 9 1/2" Thk laminated innt glazing at fitness and Comp office	252	sf					
	GL 3, GL 5, GL 9 total 15 files	75	sf					
	Clerestory at patio		incl					
	Transom @ patio		incl					
	Side files at interior		incl					
	Motorised awning window		incl					
	Subtotal							0.00
08-8300	Mirrors							
	mirrors	1.00	ls	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	2,500.00
	Subtotal							2,500.00
08-9100	Louvers	1	ls	\$ 7,500.00	\$ 7,500.00	\$ 2,500.00	\$ 2,500.00	10,000.00
	Subtotal							10,000.00
	21 - 10							

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09-0000	Finishes				\$ -	\$ -	\$ -	
09-2116	Gypsum board assembly	0.00		\$ -	\$ -	\$ -	\$ -	
	Gyp rated walls (shaft walls)	1.00	ls	\$ 40,500.00	\$ 40,500.00	\$ 110,500.00	\$ 110,500.00	151,000.00
	GWB non rated walls	0.00		\$ -	\$ -	\$ -	\$ -	
	Gyp furring	0.00		\$ -	\$ -	\$ -	\$ -	
	Gyp clg	0.00		\$ -	\$ -	\$ -	\$ -	
	Subtotal							151,000.00
09-2236	Metal lath and plaster							
	Rm 221 222 and roof	1,458.00	sf	\$ 15.00	\$ 21,870.00	\$ 28.00	\$ 40,824.00	62,694.00
	Subtotal							213,694.00
09-3000	Tiling							
	CT tiles base	250.00	sf	\$ 7.00	\$ 1,750.00	\$ 12.00	\$ 3,000.00	4,750.00
	CT wall	2,040.00	sf	\$ 12.00	\$ 24,480.00	\$ 18.00	\$ 36,720.00	61,200.00
	saddles	4.00	ls	\$ 150.00	\$ 600.00	\$ 100.00	\$ 400.00	1,000.00
	Subtotal							62,200.00
09-5153	Direct applied acoustic ceiling	0.00		\$ -	\$ -	\$ -	\$ -	0.00
	Act 1 @ -201 and -206	1350	sf	\$ 5.00	\$ 6,750.00	\$ 12.00	\$ 16,200.00	22,950.00
	Subtotal							22,950.00
09-5453	Linear metal ceilings			\$ -	\$ -	\$ -	\$ -	0.00
	Hunter douglas - luxalon linear system (MTL-10)	1872	sf	\$ 12.00	\$ 22,464.00	\$ 16.00	\$ 29,952.00	50,544.00
	Subtotal							50,544.00

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09-6429	Wood strip and plank flooring			\$ -	\$ 23,948.00	\$ -	\$ 34,091.00	58,040.00
	Wood flooring WD1 (walnut 25/32 x 3 1/4 T&G)	705	sf	\$ 19.40	\$ 13,677.00	\$ 35.00	\$ 24,675.00	38,352.00
	Wood base		lf	\$ -	\$ -	\$ -	\$ -	-
	Wood at walls 4 ft high	428	sf	\$ 24.00	\$ 10,272.00	\$ 22.00	\$ 9,416.00	19,688.00
	Subtotal							116,080.00
09-6500	Resilient wall base			\$ -	\$ -	\$ -	\$ -	0.00
	Rubber base	2200	lf	\$ 0.75	\$ 1,650.00	\$ 2.00	\$ 4,400.00	6,050.00
	Subtotal							6,050.00
09-6566	Resilient athletic flooring			\$ -	\$ -	\$ -	\$ -	-
	Rubber tiles at Health and fitness	410	sf	\$ 35.00	\$ 14,350.00	\$ 20.00	\$ 8,200.00	22,550.00
	interlocking loose rubber tiles			\$ -	\$ -	\$ -	\$ -	0.00
	Subtotal							22,550.00
09-9000	Painting and coating			\$ -	\$ -	\$ -	\$ -	-
	(Roofs)		sf	\$ 68,800.00	\$ 68,800.00	\$ 201,000.00	\$ 201,000.00	269,800.00
	Prep and paint GWB ceilings		sf	\$ -	\$ -	\$ -	\$ -	-
	Paint GWB walls		sf	\$ -	\$ -	\$ -	\$ -	-
	Paint CMU walls		sf	\$ -	\$ -	\$ -	\$ -	-
	Walls of Str concrete		sf	\$ -	\$ -	\$ -	\$ -	-
	Paint Doors and frames			\$ -	\$ -	\$ -	\$ -	-
	Paint exp ceilings			\$ -	\$ -	\$ -	\$ -	-
	Clear seal sandwich exp panel facade			\$ -	\$ -	\$ -	\$ -	-
	PAINT BEAMS AND SKYLIGHTS			\$ -	\$ -	\$ -	\$ -	-
	Misc finishes			\$ -	\$ -	\$ -	\$ -	-
	Caulk Wall Covering			\$ -	\$ -	\$ -	\$ -	-
	Peg board			\$ -	\$ -	\$ -	\$ -	-
	Subtotal							269,800.00
	21 - 12							

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CSI	Description	Quantity	unit	Unit Cost of	Total cost of	Unit cost of labor	Total cost of	Total cost of labor
Division 10	SPECIALTIES			\$ -	\$ -	\$ -	\$ -	0.00
10-1101	Visual display boards			\$ -	\$ -	\$ -	\$ -	0.00
	Display boards	1	ls	\$ 2,520.00	\$ 2,520.00	\$ -	\$ -	2,520.00
	Subtotal							2,520.00
10-1400	Signage			\$ -	\$ -	\$ -	\$ -	0.00
	Exterior Signage	1	ls	\$ 7,200.00	\$ 7,200.00	\$ 6,500.00	\$ 6,500.00	13,700.00
	Interior Signage	1	ls	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	5,000.00
	Work shop shelves							0.00
	Subtotal							18,700.00
10-2113	Metal toilet compartments							
	Toilet Partitions	2	ea	\$ 1,500.00	\$ 3,000.00	\$ 800.00	\$ 1,600.00	4,600.00
	Urinal screen	1	ea	\$ 1,000.00	\$ 1,000.00	\$ 700.00	\$ 700.00	1,700.00
	Subtotal							6,300.00
10-2601	Wall mounted corner guards				\$ -	\$ -	\$ -	0.00
	Corner guards (SS)	5	ea	\$ 150.00	\$ 750.00	\$ 250.00	\$ 1,250.00	2,000.00
	Subtotal							2,000.00
10-2700	Slide pole				\$ -	\$ -	\$ -	0.00
	Poletech							0.00
	Fireman slide pole	1	ea	\$ 9,500.00	\$ 9,500.00	\$ 5,500.00	\$ 5,500.00	15,000.00
	Landing pad							0.00
	Subtotal							15,000.00
10-4400	Fire protection specialties				\$ -	\$ -	\$ -	0.00
	Fire Extinguisher	4	ea	\$ 250.00	\$ 900.00	\$ -	\$ -	900.00
	Subtotal							900.00
	21 - 13							

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14 0000	CONVEYING SYSTEM							0.00
	Otis	1	ls	\$ 100,000.00	\$ 100,000.00	\$ 96,800.00	\$ 96,800.00	196,800.00
14-2100	Electric Traction Elevator							
	Kone : Ecopace low rise MRL				\$ -	\$ -	\$ -	
	Shindler 5500 low rise				\$ -	\$ -	\$ -	
	Subtotal							196,800.00
								0.00
210000	FIRE SUPPRESSION							0.00
210511	COMMON WORK RESULTS FOR FIRE PROTECTION							0.00
	Painting exposed pipes & existing siamese connections - BY OTHERS	0	LS					
	Cutting, patching, sleeves & seals - SLEEVES ONLY	15	LF	60.06	900.90	90.10	1,351.44	2,252.34
	Seismic Restraints	100	LS	9.38	938.00	14.08	1,407.60	2,345.60
	Testing and commissioning	1	LS	869.28	869.28	1,303.92	1,303.92	2,173.20
	Siamese Connection	1	EA	271.68	271.68	407.52	407.52	679.20
	Subtotal							7,450.34
								0.00
								0.00
211313	AUTOMATIC SPRINKLER SYSTEM							0.00
	Wet-Pipe Sprinkler system	192	EA	383.88	69,801.41	845.32	164,702.11	234,503.52
	Wet Sprinkler Heads			0.00	0.00	0.00	0.00	0.00
	4" Sch 40Bk Steel Pipe, grooved fittings, hangers	85	LF	82.33	5,382.72	84.89	8,074.05	13,456.80
	3"	100	LF	68.31	5,830.56	87.48	8,745.84	14,576.40
	2 1/2"	50	LF	48.59	2,429.58	74.39	3,719.52	6,149.20
	2"	100	LF	49.24	4,924.32	73.86	7,386.48	12,310.80
	1 1/2"	150	LF	34.88	5,231.52	62.32	7,847.28	13,078.80
	1 1/4"	50	LF	10.02	501.12	16.03	751.68	1,252.80
	1"	650	LF	21.76	14,199.68	32.85	21,449.52	35,649.20
	2" Sch 40 Galvanized Pipe, grooved fittings, hangers	150	LF	28.00	4,199.52	42.00	6,299.28	10,498.80
	Floor Control Valve Assembly	4	EA	1,307.28	5,229.12	1,860.92	7,843.68	13,072.80
	4" Valves	9	LF	507.25	4,565.28	780.88	6,847.92	11,413.20
	4" Alarm Check Valve	1	EA	1,257.12	1,257.12	1,685.68	1,685.68	2,942.80
	Connection to the pipe	2	EA	476.16	952.32	714.24	1,428.48	2,380.80
	Subtotal							0.00
								0.00

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22 0711	PLUMBING INSULATION							0.00
	Domestic pipe insulation	Incl in pipe work						0.00
	Storm water pipe insulation							0.00
	Subtotal							0.00
221000	WATER DISTRIBUTION PIPING							0.00
	Domestic Water Piping, Cold and Hot water supply and return							0.00
	3" Copper "L" pipe and fittings	735	LF	101.54	74,634.24	152.31	111,951.36	186,585.60
	2"	15	LF	33.76	506.40	50.64	759.60	1,266.00
	1 1/2"	580	LF	31.85	18,474.24	47.78	27,711.36	46,185.60
	1 1/4"	45	LF	60.83	2,728.32	90.94	4,092.48	6,820.80
	1"	65	LF	27.24	1,498.08	40.86	2,247.12	3,745.20
	3/4"	55	LF	24.82	1,365.12	37.23	2,047.68	3,412.80
	1/2"	0	LF	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Connections to the pipe	6	EA	156.40	938.40	234.60	1,407.60	2,346.00
	Water meter	1	EA	1,722.24	1,722.24	2,583.36	2,583.36	4,305.60
	Subtotal							254,667.60
								0.00
22 1300	SANITARY, WASTE, AND STORM DRAINAGE							0.00
	Underground Sanitary Waste and Vent System Piping:							0.00
	4" Single Hub-cast Iron pipe and fittings	165	EA	33.59	5,542.56	50.39	8,313.84	13,856.40
	Above Ground Sanitary Waste and Vent System Piping			0.00	0.00	0.00	0.00	0.00
	4"	676	LF	60.11	40,577.28	90.17	60,865.92	101,443.20
	3"	410	LF	55.22	22,641.12	82.83	33,961.68	56,602.80
	2"	385	LF	42.57	16,391.04	63.86	24,586.56	40,977.60
	1 1/2"	66	LF	21.91	1,205.26	32.87	1,807.92	3,013.20
	Clean out	8	EA	159.48	1,275.84	239.22	1,913.76	3,189.60
	3" Floor drain	0	EA		0.00		0.00	0.00
	4" Floor drain	21	EA	1,401.12	29,423.52	2,101.68	44,135.28	73,558.80
								0.00
								0.00
		21 - 18						0.00

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project	New Construction of FDNY Firehouse for Rescue 2
Location	1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder	ZHL Group

DOC ID: F175RES2
DDC Sponsor Agency: FDNY

[illegible]

CONTRACTOR'S BID BREAKDOWN FORM

DOC 10 F175RES2
DOC 38 Sponsor Agency FDNY

[illegible]

**Department of
Design and
Construction**

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
23 0548	VIBRATION & SEISMIC CONTROL FOR HVAC							
	Seismic Restraints	1	ls	20,000.00	20,000.00	22,000.00	22,000.00	42,000.00
					0.00		0.00	0.00
	Subtotal							42,000.00
23 0593	TESTING, ADJUSTING & BALANCING FOR HVAC							
	Testing, adjusting, balancing	1	ls	1,500.00	1,500.00	15,000.00	15,000.00	16,500.00
	Subtotal							16,500.00
23 0700	HVAC INSULATION							
	HW/CHW/Glycol piping:							
	Fiber glass insulation	80	lf	1.00	80.00	2.00	160.00	240.00
	Refrigerant piping:							
	Fiberglass insulation	1300	lf	1.00	1,300.00	2.00	2,600.00	3,900.00
	Condensate Drain Piping:							
	Fiberglass insulation	300	lf	2.00	600.00	2.00	600.00	1,200.00
	Duct insulation							
	FG Insulation	1800	sf	2.00	3,600.00	2.00	3,600.00	7,200.00
	CS Insulation	1200	sf	2.00	2,400.00	2.00	2,400.00	4,800.00
	Subtotal							17,340.00
23 0900	INSTRUMENTATION & CONTROL FOR HVAC							
	Control points	200	ea	200.00	40,000.00	300.00	60,000.00	100,000.00
	Programming software front end	1	ls	1,200.00	1,200.00	5,000.00	5,000.00	6,200.00
					0.00		0.00	0.00
	Subtotal							106,200.00
23 0994	SPARK DETECTION SYSTEM							
	Control panel & sensor	1	ls	1,500.00	1,500.00	3,200.00	3,200.00	4,700.00
	Subtotal							4,700.00

**Department of
Design and
Construction**

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10, F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
23 1000	FUEL GAS SYSTEM (BY PLUMBER)							
	Gas meter	EA	EA		0.00		0.00	0.00
	Backsaver pump				0.00		0.00	0.00
	3" Carbon steel schedule 40 standard pipe				0.00		0.00	0.00
	2"				0.00		0.00	0.00
	1 1/2"				0.00		0.00	0.00
	1 1/4"				0.00		0.00	0.00
	Gas pressure regulator				0.00		0.00	0.00
	Connection to the pipe				0.00		0.00	0.00
	Subtotal							0.00
23 2113	PIPING AND ACCESSORIES							
	Geothermal piping							
	1 1/4" geothermal HOPE pipe and fittings	500	LF	18.00	9,000.00	26.00	13,000.00	22,000.00
	Steam and condensate piping and Rumps							
	Condensate pipe and fittings	200	LF	13.00	2,600.00	41.00	8,200.00	10,800.00
	Refrigerant Piping							
	1 1/8" ACR pipe and fittings 3/4"	250	LF	16.00	4,000.00	47.00	11,750.00	15,750.00
	3/4"	200	LF	12.00	2,400.00	32.00	6,400.00	8,800.00
	5/8"	200	LF	11.00	2,200.00	25.00	5,000.00	7,200.00
	1/2"	200	LF	11.00	2,200.00	24.00	4,800.00	7,000.00
	3/8"	150	LF	10.00	1,500.00	23.00	3,450.00	4,950.00
	1/4"	150	LF	8.00	1,200.00	22.00	3,300.00	4,500.00
	Vibration & Seismic control	1	LS	2,500.00	2,500.00	6,000.00	6,000.00	8,500.00
	HW/C HW/Glycol piping							
	2 1/2" HW/C HW/Glycol Sch 40 pipe and fittings	150	LF	30.00	4,500.00	95.00	14,250.00	18,750.00
	2"	400	LF	19.50	7,800.00	68.00	27,200.00	35,000.00
	1 1/2"	200	LF	3.60	720.00	59.00	11,800.00	12,520.00
	1 1/4"	200	LF	17.00	3,400.00	48.00	9,600.00	13,000.00
	21 - 23							

**Department of
Design and
Construction**

CONTRACTORS BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10: F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	1"	100	LF	13.00	1,300.00	40.00	4,000.00	5,300.00
	3/4"	100	LF	11.00	1,100.00	35.00	3,500.00	4,600.00
	1/2"	100	LF	10.00	1,000.00	30.00	3,000.00	4,000.00
							0.00	
	Subtotal							182,670.00
23 2500	HVAC WATER TREATMENT							
	GF-1 Glycol feeder system	1	EA	1,000.00	1,000.00	2,100.00	2,100.00	3,100.00
	Chemical treatment	1	LS	500.00	500.00	1,250.00	1,250.00	1,750.00
	Subtotal							4,850.00
23 3113	METAL DUCTS							
	GI duct	32100	lbs	7.40	237,540.00	14.00	449,400.00	686,940.00
	Black Steel duct	220	lbs	16.00	3,520.00	20.00	4,400.00	7,920.00
	Boiler Intake and Exhaust duct, double wall 4" dia. galvanized	250	LF	55.00	13,750.00	88.00	22,000.00	35,750.00
	Boiler Exhaust duct, double wall 4" dia. galvanized	250	LF	55.00	13,750.00	88.00	22,000.00	35,750.00
	Duct Accessories							
	Louver	55	SF	135.00	7,425.00	200.00	11,000.00	18,425.00
	Fire smoke damper	75	SF	26.00	1,950.00	56.00	4,200.00	6,150.00
	Fire damper	25	SF	20.00	500.00	36.00	900.00	1,400.00
	Volume Damper	25	EA	15.00	375.00	3.00	75.00	450.00
	Vibration & Seismic control	1	LS	2,500.00	2,500.00	4,000.00	4,000.00	6,500.00
	Subtotal							799,285.00
23 3117	ACOUSTICAL TREATMENT							
	Liner	350	sf	3.00	1,050.00	4.41	1,543.50	2,593.50
	Subtotal							2,593.50
	21 - 24							

**Department of
Design and
Construction**

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10- F175RES2

Location: 1815 Sterling Place, Brooklyn NY 11233-6007

Sponsor Agency: FDNY

Bidder:

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
233500	Special Exhaust							
	DC-1 Dust Collection system	1	EA	10,000.00	10,000.00	15,100.00	15,100.00	25,100.00
	DC-2 Dust Collector	1	EA	6,000.00	6,000.00	11,500.00	11,500.00	17,500.00
	Sub Total							42,600.00
233713	Diffusers, registers and grilles							
	Linear Diffuser	105	LF	18.00	1,890.00	29.00	3,045.00	4,935.00
	supply ceiling Diffuser 12 x 12	19	EA	102.00	1,938.00	125.00	2,375.00	4,313.00
	Supply grille 10 x 6	8	EA	106.00	848.00	125.00	1,000.00	1,848.00
	Return grill diffuser	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Exhaust Return diffuser 12 x 12	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Exhaust return register 12 x 12	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Exhaust return register 10 x 10	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Exhaust return register 8 x 8	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Exhaust return register 12 x 6	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Exhaust return register 10 x 6	6	EA	106.00	636.00	125.00	750.00	1,386.00
	Subtotal							20,798.00
233813	Kitchen range hood							
	KX Kitchen hood Exhaust Fan 1500 CFM 1/2 hp	1	ea	3,200.00	3,200.00	1,450.00	1,450.00	4,650.00
	Sub total				3,200.00		0.00	4,650.00
236450	HVAC EQUIPMENT							
	Engine Exhaust system							
	NE tail pipe Exhaust fan 4200 CFM Nordman exhaust	1			0.00	12,000.00	12,000.00	12,000.00
	Condenser Boiler							
	B 1,2,3,4 gas fired boilers 210 MBH	4	ea	4,200.00	16,800.00	3,500.00	14,000.00	30,800.00
	Fuel Fired furnace							
	DF-1 Furnace 250 MBH	1	ea	7,900.00	7,900.00	3,800.00	3,800.00	11,700.00
	21 - 25							

**Department of
Design and
Construction**

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10- F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Fixed-Plate Air to Air Energy Recovery Equipment:							
	ERV-1 Energy recovery unit, 100 CFM	1	EA	22,000.00	22,000.00	1,620.00	1,620.00	23,620.00
	Packaged Outdoor Heating only Makeup-Air units:							
	KX-MUA Kitchen Make up Air Unit 1200 CFM	1	EA	6,250.00	6,250.00	8,000.00	8,000.00	14,250.00
	Indoor Central-Split Air-Handling unit:							
	HV-1, Heating and Ventilating Unit 1200 CFM, 1.5 HP	1	EA	23,500.00	23,500.00	15,500.00	15,500.00	39,000.00
	Split system Air-Conditioners:				0.00		0.00	0.00
	SS-1 Ductless split AC, 18MBH	1	EA	1,650.00	1,650.00	4,900.00	4,900.00	6,550.00
	SS-2 Ductless split AC, 36 MBH	1	EA	2,750.00	2,750.00	4,900.00	4,900.00	7,650.00
	COND-2 Condensing unit, 54 MBH	2	EA	4,500.00	9,000.00	4,200.00	8,400.00	17,400.00
	Water Source Unitary heat pump:				0.00		0.00	0.00
	FC-1 Ducted Split Heat Pump 24.2 MBH	1	EA	6,500.00	6,500.00	7,100.00	7,100.00	13,600.00
	FC-2 Ducted Split Heat Pump 35 MBH	1	EA	2,850.00	2,850.00	3,500.00	3,500.00	6,350.00
	FC-3 Ducted Split Heat Pump 57.6 MBH	1	EA	9,980.00	9,980.00	8,150.00	8,150.00	18,130.00
	FC-4 Ducted Split Heat Pump 9.6 MBH	1	EA	2,750.00	2,750.00	3,550.00	3,550.00	6,300.00
	FC-5 Ducted Split Heat Pump 45.7 MBH	1	EA	8,950.00	8,950.00	8,250.00	8,250.00	17,200.00
	FC-6 Ducted Split Heat Pump 9.6 MBH	1	EA	2,850.00	2,850.00	3,550.00	3,550.00	6,400.00
	FC-7 Ducted Split Heat Pump 5.5 MBH	1	EA	6,500.00	6,500.00	8,000.00	8,000.00	14,500.00
	FC-8 Ducted Split Heat Pump 4.1 MBH	1	EA	8,950.00	8,950.00	8,000.00	8,000.00	16,950.00
	FC-9 Ducted Split Heat Pump 1.2 MBH	1	EA	5,500.00	5,500.00	3,250.00	3,250.00	8,750.00
	FC-10 Ducted Split Heat Pump 5.1 MBH	1	EA	8,850.00	8,850.00	8,000.00	8,000.00	16,850.00
	FC-11 Ducted Split Heat Pump 19.2 MBH	1	EA	5,450.00	5,450.00	3,450.00	3,450.00	8,900.00
	BB-1 Branch control Box	1	EA	1,250.00	1,250.00	2,000.00	2,000.00	3,250.00
	BB-2 Branch control Box	1	EA	1,250.00	1,250.00	2,000.00	2,000.00	3,250.00
	BB-3 Branch control Box	1	EA	1,250.00	1,250.00	2,000.00	2,000.00	3,250.00
	COND-1 Condensing unit, 102 MBH	1	EA	8,500.00	8,500.00	6,100.00	6,100.00	14,600.00
	Unit Heaters:							
	UH-15 Hot Water 72.5 MBH	3	EA	1,650.00	4,950.00	2,000.00	6,000.00	10,950.00
	UH-16 Hot Water 1.3 MBH	6	EA	1,300.00	7,800.00	1,800.00	10,800.00	18,600.00
	21 - 26							

CONTRACTORS BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10: F175RES2
Sponsor Agency: FDNY

[illegible]

**Department of
Design and
Construction**

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10: F176RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
26 0971	LIGHTING CONTROLS				0.00		0.00	
	Lighting Controls & Cktry	28,600	SF	3.34	95,409.60	3.34	95,409.60	190,819.20
	Subtotal				95,409.60		95,409.60	190,819.20
262400	ELECTRICAL SERVICE SYSTEM				0.00		0.00	
	Receptacles	121	EA	146.33	17,705.69	292.66	35,411.38	53,117.06
	Receptacle Quad	28	EA	340.72	9,540.05	404.95	11,338.66	20,878.70
	ENTR	1	EA	7,882.51	7,882.51	10,004.72	10,004.72	17,887.24
	Photocell	5	EA	909.52	4,547.58	1,485.55	7,427.76	11,975.34
	Control Station - 3-Button	4	EA	1,212.70	4,850.78	1,629.55	6,516.21	11,368.99
	Warning Bell 120v	24	EA	757.93	18,190.37	1,035.84	24,860.16	43,050.53
	Receptacle GFI WP	14	EA	779.59	10,914.29	1,147.73	16,068.19	26,982.48
	Cord & Reel Receptacle	2	EA	454.76	909.53	636.66	1,273.32	2,182.85
	Receptacle 20/2 Twist-Lock	3	EA	454.76	1,364.29	651.83	1,955.48	3,319.78
	Break Glass Station WP	1	EA	1,591.66	1,591.66	1,576.50	1,576.50	3,168.16
	Subtotal				3,865.48		4,805.30	193,931.12
26- 2415	ELECTRICAL DISTRIBUTION SYSTEM				0.00		0.00	
	3/4" Emk. 4# 12	500	LF	3.04	1,518.00	21.83	10,914.00	12,432.00
	3/4" Rigid, 4#10	300	LF	4.55	1,364.40	34.86	10,458.00	11,822.40
	1" Rigid, 4#6	500	LF	9.10	4,548.00	16.98	8,490.00	13,038.00
	1" Rigid, Controls	500	LF	4.55	2,274.00	18.49	9,246.00	11,520.00
	1 1/4" Rigid, 4#4	500	LF	15.16	7,578.00	36.38	18,192.00	25,770.00
	1 1/4" Rigid, 4#2	400	LF	17.44	6,974.40	26.53	10,612.80	17,587.20
	2" Rigid, 4 1/0	500	LF	19.70	9,852.00	30.31	15,156.00	25,008.00
	2" Rigid, 4 3/0	300	LF	33.35	10,004.40	56.09	16,826.40	26,830.80
	3 1/2" Rigid, 4 500 Mcm	200	LF	77.30	15,460.80	121.27	24,254.40	39,715.20
	#8 MI Cable	600	LF	10.61	6,364.80	25.16	15,098.40	21,463.20
	#6 MI Cable	600	LF	13.64	8,186.40	21.35	12,808.80	20,995.20
	Subtotal				30,012.00		52,161.60	226,182.00
	21 - 28							

Department of
Design and
Construction

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC ID: F175RES2

Location: 1815 Sterling Place Brooklyn, NY 11233-6007
Bidder:

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
26 2923	ELECTRICAL POWER EQUIPMENT			-	0.00	-	0.00	
	100 Amp Panel Board	1	EA	3,031.74	3,031.74	7,276.16	7,276.16	10,307.90
	125 Amp Panel Board	1	EA	3,941.26	3,941.26	8,943.61	8,943.61	12,884.87
	225 A.m.p Panel Board	1	EA	4,850.77	4,850.77	7,261.01	7,261.01	12,111.78
	400 Amp Panel Board	1	EA	9,095.21	9,095.21	11,065.84	11,065.84	20,161.04
	800 Amp Main Distr Board	1	EA	15,158.68	15,158.68	9,095.21	9,095.21	24,253.88
	TVSS @ Distr Board	3	EA	1,515.86	4,547.59	2,475.91	7,427.74	11,975.33
	Manual Snap Switch Starter, 20/1 Disc	7	EA	498.07	3,486.50	1,450.90	10,156.27	13,642.78
	Manual Snap Switch Starter WP	4	EA	985.31	3,941.23	2,993.84	11,975.38	15,916.61
	20/2 Amp Disconnect	14	EA	411.44	5,760.22	866.21	12,126.91	17,887.13
	30 Amp Disconnect	12	EA	543.18	6,518.16	1,048.48	12,581.71	19,099.87
	60 Amp Disconnect	6	EA	909.52	5,457.10	2,122.21	12,733.27	18,190.37
	100 Amp Disconnect Elev	1	EA	2,425.39	2,425.39	3,334.91	3,334.91	5,760.30
	Elev CP Termis	1	EA	606.35	606.35	1,409.76	1,409.76	2,016.11
	Con Ed Utility Fees	1	LS	-	-	-	-	4,347.60
	800 Amp Service End Box	1	EA	9,701.56	9,701.56	12,126.94	12,126.94	21,828.49
	800 Amp CT Cabinet	1	EA	12,733.28	12,733.28	18,645.17	18,645.17	31,378.45
	800 Amp Service Disconnect	1	EA	10,611.07	10,611.07	10,914.24	10,914.24	21,525.31
	200 Amp Service Disconnect	1	EA	3,486.49	3,486.49	3,941.26	3,941.26	7,427.75
	30 Amp Disconnect @ UPS	1	EA	1,667.46	1,667.46	3,334.91	3,334.91	5,002.37
	60 Amp Disconnect @ UPS	1	EA	3,183.32	3,183.32	3,941.26	3,941.26	7,124.58
	Install Door Oper FBO	1	EA	757.93	757.93	1,667.46	1,667.46	2,425.39
	Install Nema O Starter FBO	3	EA	303.17	909.50	606.35	1,819.04	2,728.55
	Install Nema 1 Starter FBO	2	EA	682.14	1,364.28	1,212.70	2,425.39	3,786.67
	Install 5-10 HP VFD FBO	10	EA	454.76	4,547.64	666.98	6,669.84	11,217.48
	Install 1 OHP VFD FBO	2	EA	1,515.86	3,031.73	2,273.80	4,547.59	7,579.32
	Install Fire Pump CP FBO	1	EA	757.93	757.93	1,819.04	1,819.04	2,576.98
	10 Kva UPS	1	EA	65,182.30	65,182.30	43,808.40	43,808.40	108,990.70

**Department of
Design and
Construction**

CONTRACTORS BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

DOC 10 F175RES2
Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Hood Exhaust Interlock, Shutdown wiring	1	LS	1,970.63	1,970.63	1,970.63	1,970.63	3,941.26
	Subtotal			-	-	-	0.00	426,291.86
263214	EMERGENCY POWER SYSTEM GASEOUS TYPE ENGINE						0.00	
	250 Kw Emergency Generator 1	1	EA	-	-	95,499.65	95,499.65	95,499.65
	Autotransfer Sw 30A 1	1	EA	-	-	3,031.74	3,031.74	3,031.74
	Autotransfer Sw 800A 1	1	EA	-	-	7,427.75	7,427.75	7,427.75
	125 Kw Load Bank 1	1	EA	-	-	9,398.38	9,398.38	9,398.38
	800 Amp Enclosed Ckt Brkr 1	1	EA	-	-	9,095.21	9,095.21	9,095.21
	Autotransfer Sw 60A 3	3	EA	-	-	2,021.16	6,063.48	6,063.48
	Autotransfer Sw 1 00A 1	1	EA	-	-	6,366.65	6,366.65	6,366.65
	Electronic Submetering 1	1	EA	-	-	5,002.37	5,002.37	5,002.37
	60 Amp Encl Ckt Brkr 1	1	EA	-	-	3,031.74	3,031.74	3,031.74
	100 Amp Encl Ckt Brkr	1	EA	-	-	4,547.60	4,547.60	4,547.60
	Generator WP/Sound Encl	1	EA	-	-	9,095.21	9,095.21	9,095.21
	Rigging	1	LS	-	-	2,413.87	2,413.87	2,413.87
	Subtotal			-	-	-	-	160,973.64
26 4100	LIGHTNING PROTECTION SYSTEM							
	Service Grounding	1	LS	-	-	-	-	36,633.46
	Subtotal			-	-	-	-	36,633.46
26 4313	SURGE PROTECTION DEVICES							
	Surge Protector	3	EA	808.46	2,425.39	1,010.58	3,031.74	5,457.13
	Main Ground Bar	1	EA	1,515.86	1,515.86	3,031.74	3,031.74	4,547.60
	Eqpt Ground	16	EA	265.27	4,244.35	397.92	6,366.72	10,611.07
	Small Ground Bus	8	EA	378.97	3,031.78	625.30	5,002.37	8,034.14
	Ground Fault Protection Module	6	EA	581.09	3,486.53	732.67	4,396.03	7,882.56
	Subtotal							109,799.43

**Department of
Design and
Construction**

CONTRACTORS BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10: F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Sponsor Agency: FDNY

Bidder:

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
26 5100	LIGHTING EQUIPMENT LAMPS AND BALLASTS			-		-		
	Type F1, 1 a	150	EA	-		-		
	Type F1EM	18	EA	-		-		
	Type F2	14	EA	-		-		
	Type F2.1VL		EA	-		-		
	Type F3	20	EA	-		-		
	Type F3AL	6	EA	-		-		
	Type F3ALEM	14	EA	-		-		
	Type F3A	28	EA	-		-		
	Type F3AEM	7	EA	-		-		
	Type F3AAL	1	EA	-		-		
	Type F3B	23	EA	-		-		
	Type F3BEM	2	EA	-		-		
	Type F3BAL	24	EA	-		-		
	Type F3C	3	EA	-		-		
	Type F3CAL	6	EA	-		-		
	Type F5A	5	EA	-		-		
	Type F11	2	EA	-		-		
	Type F11AL	10	EA	-		-		
	Type F11ALEM	3	EA	-		-		
	Type F12	3	EA	-		-		
	Type F13	8	EA	-		-		
	Type F14	4	EA	-		-		
	Type F14A	4	EA	-		-		
	Type F15	4	EA	-		-		
	Type F17	1	EA	-		-		
	Type FX 1	15	EA	-		-		
	Type FX3	2	EA	-		-		
	Type FX4	2	EA	-		-		
		21 - 31						

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC ID: F175RES2
Sponsor Agency: FDNY

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**Department of
Design and
Construction**

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	3/4" Emt, #2	200	LF	9.10	1,819.20	33.50	6,700.80	8,520.00
	1" Emt, #3/0	200	LF	12.13	2,426.40	39.41	7,881.60	10,308.00
	PV Panel, 230W	3	EA	12,126.94	36,380.81	6,063.47	18,190.40	54,571.21
	Micro Inverter	3	EA	3,031.74	9,095.22	606.35	1,819.04	10,914.26
	Combiner box	1	EA	1,970.63	1,970.63	909.52	909.52	2,880.14
	Install Small CP	1	EA	606.35	606.35	909.52	909.52	1,515.86
	Autotransfer Sw 30A	1	EA	606.35	606.35	909.52	909.52	1,515.86
	30/2 Amp Disconnect	1	EA	757.93	757.93	1,212.70	1,212.70	1,970.63
	30/2 Amp Meter	1	EA	757.93	757.93	1,212.70	1,212.70	1,970.63
	40/2 Amp Encl Ckt Brkr	1	EA	1,515.86	1,515.86	1,819.04	1,819.04	3,334.91
	sub total			-	0.00	-	0.00	124,544.71
27 0000	COMMUNICATIONS							
	TELEPHONE/ DATA CABLING SYSTEM				0.00		0.00	
	Tekco Demarc	1	EA	-	-	-	-	-
	3/4" Rigid Cdt	300	LF	4.55	1,364.40	24.25	7,275.60	8,640.00
	3/4" EMT Cdt	300	LF	1.51	453.60	9.10	2,738.80	3,182.40
	Tel/Data Outlet 6c	19	EA	287.22	5,457.18	485.08	9,216.44	14,673.62
	Tel. Fax, Modem Outlet T	3	EA	1,515.86	4,547.59	2,374.86	7,124.58	11,672.17
	Voice Alarm System			-	0.00	-	0.00	0.00
	Terminal Box	1	LS	-	-	-	-	2,905.41
	Riser June Box 12"	3	EA	606.35	1,819.04	909.52	2,728.55	4,547.59
	3" Rigid, Riser Cables	300	LF	15.16	4,546.80	80.84	24,253.20	28,800.00
	3/4" Rigid Cdt	200	LF	4.55	909.60	27.29	5,457.60	6,367.20
	3/4" EMT Cdt	200	LF	1.51	302.40	14.40	2,880.00	3,182.40
	1" Rigid Cdt	900	LF	3.04	2,732.40	16.36	14,720.40	17,452.80
	Shielded Pair Cable	6,000	LF	0.76	4,536.00	2.44	14,616.00	19,152.00
	Voice Alarm Speaker	24	EA	606.35	14,552.35	381.49	9,155.81	23,708.16
	Red Phone R	2	EA	757.93	1,515.86	1,667.46	3,334.92	4,850.78
	21 - 33							

**Department of
Design and
Construction**

CONTRACTORS BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10: F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Sponsor Agency: FDNY

Bidder:

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Intercom System			-	0.00	-	0.00	
	Terminal Box	1	LS	-	-	-	-	2,905.41
	Riser Junc Box 12"	6	EA	151.58	909.50	303.17	1,819.01	2,728.51
	3/4" Rigid Cdt	200	LF	4.55	909.60	24.25	4,850.40	5,760.00
	3/4" EMT Cdt	1,000	LF	1.51	1,512.00	9.10	9,096.00	10,608.00
	1" Rigid Cdt	600	LF	3.04	1,821.60	15.16	9,093.60	10,915.20
	Shielded Pair Cable	8,000	LF	0.76	6,048.00	2.42	19,392.00	25,440.00
	Intercom	10	EA	606.35	6,063.48	909.52	9,095.16	15,158.64
	Door Annunciator	2	EA	606.35	1,212.70	1,212.70	2,425.39	3,638.09
	Power Supply	1	LS	-	-	-	-	3,789.67
	House Bell System:			-	0.00	-	0.00	
	Terminal Box	1	LS	-	-	-	-	2,905.41
	3/4" Rigid Cdt	200	LF	4.55	909.60	24.25	4,850.40	5,760.00
	3/4" EMT Cdt	600	LF	1.51	907.20	9.10	5,457.60	6,364.80
	#12 Wire	2,000	LF	0.30	600.00	1.82	3,648.00	4,248.00
	Bell	24	EA	606.35	14,552.35	909.52	21,828.38	36,380.74
	Door Annunciator:			-	0.00	-	0.00	
	3/4" Rigid Cdt	200	LF	4.55	909.60	24.25	4,850.40	5,760.00
	#12 Wire	1,000	LF	0.30	300.00	1.82	1,824.00	2,124.00
	Electric Strike	2	EA	606.35	1,212.70	909.52	1,819.03	3,031.73
	Intercom Master Station	1	EA	6,972.98	6,972.98	3,486.49	3,486.49	10,459.46
	Intercom Remote Station	1	EA	4,699.19	4,699.19	3,031.74	3,031.74	7,730.93
	Door Release Relay	2	EA	454.76	909.53	909.52	1,819.03	2,728.56
	Power Supply	1	EA	909.52	909.52	1,364.28	1,364.28	2,273.80
	LV Transformer	1	EA	1,064.71	1,064.71	1,819.04	1,819.04	2,883.76
	SUBTOTAL			-	0.00	-	0.00	322,729.26
	TELEVISION CABLING SYSTEM			-	0.00	-	0.00	
	Cable TV Demarc	2	EA	-	-	-	-	

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
28 0000 283100	Coax Cable	1,600	LF	3.04	4,857.60	9.50	15,206.40	20,064.00
	CAT 6 Cable	2,000	LF	1.51	3,024.00	8.04	16,080.00	19,104.00
	TV Outlet	8	EA	303.17	2,425.34	515.40	4,123.20	6,548.54
	SUBTOTAL			-	0.00	-	0.00	45,716.54
	ELECTRONIC SAFETY AND SECURITY			-	0.00	-	0.00	
	2B 3100 TEMPORAL 3 CLASS A FIRE ALARM			-	0.00	-	0.00	45,476.02
	Fire House Low Voltage System:			-	0.00	-	0.00	
	3/4" Emt, Cables	1,000	LF	3.04	3,036.00	9.55	9,552.00	12,588.00
	Small UPS	1	EA	-	-	3,183.32	3,183.32	3,183.32
	UPS Battery System (Install, FBO)	1	LS	-	-	1,819.04	1,819.04	1,819.04
	1900 Signal Power Box	142	EA	-	-	13.87	1,969.82	1,969.82
	Gold Box (Instal II , FBO)	1	EA	-	-	4,850.77	4,850.77	4,850.77
	Flet Panel Display Manito	1	EA	-	-	4,850.77	4,850.77	4,850.77
	PC CATS	1	EA	-	-	4,850.77	4,850.77	4,850.77
	Install HWSP FBO	1	EA	-	-	4,850.77	4,850.77	4,850.77
	Network Router	1	EA	-	-	4,850.77	4,850.77	4,850.77
	Smoke Detector System w/Fan Shutdown & Elevator Recall			-	-	-	0.00	
	Audible/Visual	51	EA	-	-	386.40	19,706.40	19,706.40
	Audible/Visual WP	6	EA	-	-	506.35	3,638.09	3,638.09
	Smoke Detector	13	EA	-	-	571.37	7,427.78	7,427.78
	Heat Detector	14	EA	-	-	584.69	8,185.63	8,185.63
	CO Detector	4	EA	-	-	606.35	2,425.39	2,425.39
	Smoke/CO Detector	3	EA	-	-	606.35	1,819.04	1,819.04
	Duct Detector	1	EA	-	-	606.35	606.35	606.35
	Strobe	10	EA	-	-	606.35	6,063.48	6,063.48
	Horn	3	EA	-	-	606.35	1,819.04	1,819.04
	CO Strobe	3	EA	-	-	606.35	1,819.04	1,819.04
Central Equipment FACP	1	LS	-	-	5,002.37	5,002.37	5,002.37	
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CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC 10: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Misc Connections, Modules	17	EA	-		392.34	6,669.78	6,669.78
	FSD Connection s. 120V	3	EA	-		656.88	1,970.64	1,970.64
	Fire Alarm			-	0.00	-	0.00	
	Riser Junc Box	3	EA	303.17	909.50	1,819.04	5,457.13	6,366.64
	1 1/2" Rigid, TV Riser Cables	1,000	LF	6.06	6,060.00	45.48	45,480.00	51,540.00
	3/4" Rigid Cdt	2,000	LF	3.04	6,072.00	27.59	55,176.00	61,248.00
	3/4" EMT Cdt	7,000	LF	1.51	10,584.00	13.80	96,600.00	107,184.00
	Teflon Cable	21,000	LF	0.72	15,120.00	3.35	70,308.00	85,428.00
	#12 Wire	4,000	LF	0.30	1,200.00	1.74	6,960.00	8,160.00
	314" Emt, CAT 6	2,000	LF	3.04	6,072.00	19.70	39,408.00	45,480.00
	FDNY Terminal Cabt	1	EA	-		4,850.77	4,850.77	4,850.77
	FDNY Pu II box	1	EA	-		4,850.77	4,850.77	4,850.77
	FCO Panel	1	EA	-		1,970.63	1,970.63	1,970.63
	60 Amp FA Disconnect	1	EA	-		1,970.63	1,970.63	1,970.63
	60 Amp FA FCO	1	EA	-		1,970.63	1,970.63	1,970.63
	Pull Station	8	EA	-		397.92	3,183.36	3,183.36
	Pull Station WP	3	EA	-		656.88	1,970.64	1,970.64
	Data Connections	3	EA	-		656.88	1,970.64	1,970.64
	Digital Alarm Communicator	1	EA	-		2,910.47	2,910.47	2,910.47
	SUBTOTAL			-	0.00	-	0.00	547,498.29
31 0000	EARTHWORKS							
	Earth work							
	Clear and grub incl grading	1	in	\$ 2,500.00	\$ 2,500.00	\$ 7,500.00	\$ 7,500.00	10,000.00
	SUBTOTAL			-	0.00	-	0.00	10,000.00
				-	0.00	-	0.00	0.00
	Earthwork + Erosion and sediment control			-	0.00	-	0.00	0.00
	Silt fence	440	N	\$ 1.50	\$ 680.00	\$ 2.00	\$ 880.00	1,540.00

**Department of
Design and
Construction**

CONTRACTORS BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10 F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Sponsor Agency: FDNY

Bidder:

CST Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Stabilized construction entry	1	ls	\$ 250.00	\$ 250.00	\$ 2,500.00	\$ 2,500.00	2,750.00
	Tempstock pile silt fence	1	ls	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	500.00
	Protect existing trees	3	ls	\$ 250.00	\$ 750.00	\$ 1,250.00	\$ 3,750.00	4,500.00
	SUBTOTAL			-	0.00	-	0.00	9,290.00
31-5000	Excavation support and monitoring			-	0.00	-	0.00	0.00
	Excavation and fill				\$ -	\$ -	\$ -	0.00
	Mass excavation	1	ls	\$ 168,000.00	\$ 168,000.00	\$ 200,000.00	\$ 200,000.00	368,000.00
	Haul and dispose				\$ -	\$ -	\$ -	0.00
	Compacted granular fill	1	ls	\$ 9,200.00	\$ 9,200.00	\$ 11,000.00	\$ 11,000.00	20,200.00
	Excav and b-fill for utility (in JRM Number)	by JRM						0.00
	Compact granular fill for utility (in JRM Number)	by JRM						0.00
	Shore West building	in footings						0.00
	Shore new build excav	in Rigs				\$ -		0.00
	Shore at utility	in utility				\$ -		0.00
	SUBTOTAL			-	0.00	-	0.00	388,200.00
				-	0.00	-	0.00	0.00
31-6000	Footings			-	0.00	-	0.00	0.00
incl add 2	Driven HP soldier piles				\$ -	\$ -	\$ -	0.00
	Equip mob and demob	1	ls	\$ 85,000.00	\$ 85,000.00	\$ -	\$ -	85,000.00
	HP 12x74	1	ls	\$ 230,000.00	\$ 230,000.00	\$ 300,000.00	\$ 300,000.00	530,000.00
	Added bracing to piles for SOE	1	ls	\$ 80,000.00	\$ 80,000.00	\$ -	\$ -	80,000.00
						\$ -	\$ -	0.00
	Allow for access to adjacent pits incl minor repair	1	ls	\$ 100,000.00	\$ 100,000.00	\$ -	\$ -	100,000.00
	Restors at pile / added work at adjacent foundation	1	ls	\$ 35,000.00	\$ 35,000.00	\$ -	\$ -	35,000.00
	Added excavation and back fill to Underpinning	40	cy	\$ 450.00	\$ 18,000.00	\$ 1,250.00	\$ 50,000.00	68,000.00
	Added jacks and misc	1	ls	\$ 25,000.00	\$ 25,000.00	\$ 20,000.00	\$ 20,000.00	45,000.00
	SUBTOTAL			-	0.00	-	0.00	943,000.00
				-	0.00	-	0.00	0.00
32-000	Exterior Improvement			-	0.00	-	0.00	0.00
				-	0.00	-	0.00	0.00
32-1400+	Unit Pavers			-	0.00	-	0.00	0.00
	Granite paver type A w/9" reinf. conc +6" granula base	1364	sf	\$ 30.00	\$ 40,920.00	\$ 31.00	\$ 42,284.00	83,204.00

Department of
Design and
Construction

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DOC NO: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Granite paver type B w/9" reinf. conc. +6" granular base	1820	sf	\$ 30.00	\$ 54,600.00	\$ 31.00	\$ 56,426.00	111,026.00
	Granite paver type C w/ drainage base +6" granular base	1460	sf	\$ 33.00	\$ 48,180.00	\$ 31.00	\$ 45,290.00	93,440.00
	Steel faced curb (Ext. grill)	140	sf	\$ 45.00	\$ 6,300.00	\$ 20.00	\$ 2,800.00	9,100.00
	Granite curbs at planters	320	#	\$ 45.00	\$ 14,400.00	\$ 55.00	\$ 17,600.00	32,000.00
	Pigmented concrete A see below							0.00
	Pigmented concrete pavement B	4050	sf	\$ 15.00	\$ 60,750.00	\$ 15.00	\$ 60,750.00	121,500.00
	SUBTOTAL			-	0.00	-	0.00	450,264.00
				-	0.00	-	0.00	0.00
32-2000	Pavement (steel faced curb conc pavement)			-	0.00	-	0.00	0.00
	Trench restoration within rt of way	360	lf	\$ 150.00	\$ 54,000.00	\$ 550.00	\$ 198,000.00	252,000.00
	Full depth roadway	4	loc	\$ 4,500.00	\$ 18,000.00	\$ 2,500.00	\$ 10,000.00	28,000.00
	Mill and resurface top course C 100	2018	sf	\$ 6.70	\$ 13,520.60	\$ 12.25	\$ 24,720.50	38,241.10
					\$ -	\$ -	\$ -	0.00
	SUBTOTAL			-	0.00	-	0.00	318,241.10
32-3119	Decorative Metal fences, landscape metal fabrications				\$ -	\$ -	\$ -	0.00
	Metal gate @ south	1	ls	\$ 15,474.00	\$ 15,474.00	\$ 4,216.00	\$ 4,216.00	39,690.00
	Double gate	1	ls	\$ 20,000.00	\$ 20,000.00	\$ 11,250.00	\$ 11,250.00	31,250.00
	SUBTOTAL			-	0.00	-	0.00	70,940.00
32-3000	Landscape metal fabrication				\$ -	\$ -	\$ -	0.00
	Green wall - metal panels (3056 sf)	3065	sf	\$ 68.00	\$ 208,420.00	\$ 44.00	\$ 134,880.00	343,280.00
	Steel edge				\$ -	\$ -	\$ -	0.00
	Metal planter 6 x 6 w/ bench				\$ -	\$ -	\$ -	0.00
	metal planter 3-6" n high				\$ -	\$ -	\$ -	0.00
	trellis for vines 24" and 36"				\$ -	\$ -	\$ -	0.00
	SUBTOTAL			-	-	-	-	343,280.00
	21 - 34			-	-	-	-	-

CONTRACTOR'S BID BREAKDOWN FORM

DOC 10 F175RES2
Sponsor Agency: FDNY

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**Department of
Design and
Construction**

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10: F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Sponsor Agency: FDNY

Bidder:

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
33 0000	UTILITIES							
	JRM Construction for excav.							
33 0000	OTHER UTILITIES	1	ls	15,000.00	15,000.00	45,000.00	45,000.00	60,000.00
	Electrical Utilities				0.00			0.00
	Property line Box	1	ED	4,500.00	4,500.00	-	0.00	4,500.00
	Relocate street light	1	IEA	1,200.00	1,200.00	5,000.00	5,000.00	6,200.00
	Con ed Utility fees	1	LS					
	FA/ Communications	1	ls					
	4" pvc 4 500 mom UG (by electricians) excav here	350	lf					
	Trench and back fill	365	LF					
	Fa Cable (be electrician)							
	4" gas service	1	ls	-	0.00	-	0.00	0.00
	Connect 4" gas service to main	365	ft	\$ 77.00	\$ 28,105.00	\$ 85.00	\$ 31,025.00	
	sub total							70,700.00
33-1000	WATER UTILITIES	1	ls	19,200.00	\$ 19,200.00	\$ 74,400.00	\$ 74,400.00	93,600.00
	4" sched 40 fire service	40	LF	-	0.00	-	0.00	0.00
	connect fire service to exist main	1	LS	-	0.00	-	0.00	0.00
	Domestic water 4" e	50	ft	-	0.00	-	0.00	0.00
	Domestic 4" domestic service to existing	50	ft	-	0.00	-	0.00	0.00
	irrigation	1	LS	-	0.00	-	0.00	0.00
	Sub total							93,600.00
33-3000	SANITARY AND STORM SEWERAGE UTILITIES							
		1	ls	\$ 146,800.00	\$ 146,800.00	\$ 175,000.00	\$ 175,000.00	321,800.00
	36" perforated HDPE	200	lf					
	Excavation and back fill	1	ls	-	0.00	-	0.00	
	Impervious liner	2,200	sf	-	0.00	-	0.00	
				-	0.00	-	0.00	
	21 - 40							

**Department of
Design and
Construction**

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC 10 F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Sponsor Agency: FDNY

Bidder:

CSI Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
	Competition	1	ls	-	0.00	-	0.00	
	Gravel bedding	220	cy	-	0.00	-	0.00	
	Filter fabric	450	sy	-	0.00	-	0.00	
	Catch basin / drains	7	EA	-	0.00	-	0.00	
	Clean out	2	-	-	0.00	-	0.00	
	Trench drain	70	lf	-	0.00	-	0.00	
	Excavate	1	ls	-	0.00	-	0.00	
	Concrete to trench drain			-	0.00	-	0.00	
	6" x 23'	23	lf	-	0.00	-	0.00	
	8" x 14 R	14	lf	-				
	8" x 40'	40	lf	-	0.00	-	0.00	
	8" x 8'	8	LF	-				
	Yard drain	7	EA	-	0.00	-	0.00	
	Hooded drain man hole incl excav	1	EA	-	0.00	-	0.00	
	2" DIP	8	LF	-	0.00	-	0.00	
	8" dip	210	LF	-	0.00	-	0.00	
	10" dip	15	LF	-				
	12" dip	15	LF	-	0.00	-	0.00	
	Fittings	1	ls	-	0.00	-	0.00	
	Connect 8" hdpe to existing 12 Combine	1	ls	-	0.00	-	0.00	
	Subtotal							321,800.00
43 000	PROCESS GAS AND LIQUID HANDLING PURIFICATION AND STORAGE EQUIPMENT							
	Empire environmental	1	ls	102,000.00	102,000.00	82,000.00	82,000.00	184,000.00
43 4116	PETROLEUM BULK STORAGE TANK SYATEM							
	1000 gallons above ground double tank							
	audible ground overfill alarm							
	Audible visual beacon light and alarm acknowledge switch							
	21 - 41							

**Department of
Design and
Construction**

CONTRACTORS BID BREAKDOWN FORM
CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

DOC ID: F175RES2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Sponsor Agency: FDNY

Bidder:

CST Number	Description	Quantity	unit	Unit Cost of Material	Total cost of material	Unit cost of labor	Total cost of labor	Total cost of labor and material
43 4117	6" emergency vent	1	ls	-	0.00	-	0.00	
	10 gail integral overfill with hinge	1	EA	-	0.00	-	0.00	
	hydrostatic test	1	EA	-	0.00	-	0.00	
	flex connection	1	ls	-	0.00	-	0.00	
	4" fill port	1	ls	-	0.00	-	0.00	
	Fuel Dispenser	1	ls	-	0.00	-	0.00	
	Fuel management and monitoring system TLS - 450	1	ls	-	0.00	-	0.00	
	Suction with nozzle hose, wheel, breakaway and high hose	1	ls	-	0.00	-	0.00	
	Sub total			-	0.00	-	0.00	184,000.00
	PETROLEUM BULK STORAGE PRODUCT PIPING (Inabove by sub quoted)							
	2" FUEL VENT	65	LF					
	6" FUEL VENT	75	LF					
	Sub quoted							
	Gemstar			-	0.00	-	0.00	
	Empire			-	0.00	-	0.00	
				-	0.00	-	0.00	
				-	0.00	-	0.00	
	TOTAL CONTRACT 1 - GENERAL CONSTRUCTION WORK			-	0.00	-	0.00	24,968,978.08
				-	0.00	-	0.00	
				-	0.00	-	0.00	

24970159

Tax ID #: 57-1155659

APT E-

PIN#: 85016B0048

SCHEDULE B - Part II: M/WBE Participation Plan

Part II to be completed by the bidder/proposer:

Please note: For Non-M/WBE Prime Contractors who will NOT subcontract any services and will self-perform the entire contract, you must obtain a FULL waiver by completing the Waiver Application on pages 9 and 9a and timely submitting it to the contracting agency pursuant to the Notice to Prospective Contractors. Once a FULL WAIVER is granted, it must be included with your bid or proposal and you do not have to complete or submit this form with your bid or proposal.

Section I: Prime Contractor Contact Information

Tax ID #	57-1155659	FMS Vendor ID #	
Business Name	Z H L Group, INC	Contact Person	Yevgeniy Lvovskiy
Address	2383 McDonald Avenue, Brooklyn, NY 11223		
Telephone #	718-331-2807	Email	zh@zhlgroupp.com

Section II: M/WBE Utilization Goal Calculation: Check the applicable box and complete subsection.**PRIME CONTRACTOR ADOPTING AGENCY M/WBE PARTICIPATION GOALS**

<input type="checkbox"/> For Prime Contractors (Including Qualified Joint Ventures and M/WBE firms) adopting Agency M/WBE Participation Goals.	Total Bid/Proposal Value	Agency Total Participation Goals (Line 1, Page 6)	Calculated M/WBE Participation Amount
<p>Calculate the total dollar value of your total bid that you agree will be awarded to M/WBE subcontractors for services and/or credited to an M/WBE prime contractor or Qualified Joint Venture.</p> <p>Please review the Notice to Prospective Contractors for more information on how to obtain credit for M/WBE participation.</p>	25,123,159.08	17%	\$ 4,270,937.04 Line 2

PRIME CONTRACTOR OBTAINED PARTIAL WAIVER APPROVAL: ADOPTING MODIFIED M/WBE PARTICIPATION GOALS

<input type="checkbox"/> For Prime Contractors (Including Qualified Joint Ventures and M/WBE firms) adopting Modified M/WBE Participation Goals.	Total Bid/Proposal Value	Adjusted Participation Goal (From Partial Waiver)	Calculated M/WBE Participation Amount
<p>Calculate the total dollar value of your total bid that you agree will be awarded to M/WBE subcontractors for services and/or credited to an M/WBE prime contractor or Qualified Joint Venture.</p> <p>Please review the Notice to Prospective Contractors for more information on how to obtain credit for M/WBE participation.</p>			\$ Line 3

Tax ID #: 57-1155659

APT E-
PIN#: 85016B0048

Contract # 1 - General Construction Work

SCHEDULE B - M/WBE Utilization Plan**Part I: M/WBE Participation Goals**

Part I to be completed by contracting agency

Contract Overview

APT E-Pin # 85016B0048 FMS Project ID#: F175RES2
 Project Title/Agency FDNY New Firehouse for Rescue 2
 PIN # 8502016FI0002C
 Bid/Proposal
 Response Date: January 6, 2016
 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 Negrón Title M/WBE Liaison & Compliance Analyst
 Telephone # (718) 391-1502 Email negronn@ddc.nyc.gov

Project Description (attach additional pages if necessary)

Located in the Brownsville neighborhood of Brooklyn, the new firehouse is intended to become a tool for instruction, enabling the Company to stage and simulate a wide range of emergency conditions in, on, and around the building. The building's primary structure and enclosure consist of precast concrete panels and poured concrete floors. To enhance the Company's training, the new firehouse is organized around a large interior void, a space that extends from the ground to roof level. The void enables the team to practice rescue scenarios that mimic conditions common to the city, using its height and associated elements of balconies, bridge, doorways, ladders, and stairs. On the exterior, red glazed terracotta panels surround a smaller-scale series of voids—windows and doors—with highly crafted details animating these points of connection between the firehouse and the community it serves. A green roof, geothermal HVAC system, and solar hot-water heating system reduce energy use, lowering the building's carbon footprint.

M/WBE Participation Goals for Services

Enter the percentage amount for each group or for an unspecified goal. Please note that there are no goals for Asian Americans in Professional Services

Prime Contract Industry: Construction

Group	Percentage	
<u>Unspecified *</u>	17	%
or		
Black American	Unspecified	%
Hispanic American	Unspecified	%
Asian American	Unspecified	%
Women	Unspecified	%
Total Participation Goals	17	%

Line 1

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

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

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

☐ MBE ☐ WBE

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

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

Section IV: General Contract Information

What is the expected percentage of the total contract dollar value that you expect to award in subcontracts for services, regardless of M/WBE status? % 60

Enter brief description of the type(s) and dollar value of subcontracts for all any services you plan on subcontracting if awarded this contract. For each item, indicate whether the work is designated for participation by MBEs and/or WBEs and the time frame in which such work is scheduled to begin and end. Use additional sheets if necessary.

1. Plumbing 1,400,000
2. Electrical 3,000,000
3. Carpentry 500,000
4. Excavation 500,000
5. Piping 200,000
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.

✓ **Scopes of Subcontract Work**

Section V: Vendor Certification and Required Affirmations

I hereby:

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

Signature

Date 1/14/2016

Print Name Yevgeniy Lyovskiy

Title President

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: ZHL GROUP, INC

DDC Project Number: FITS RES 2

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

Company has previously worked for DDC ✓ YES NO

2. Type(s) of Construction Work

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

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	INTRASTATE RATE	INTERSTATE RATE
<u>2015</u>	<u>1.4</u>	<u> </u>
<u>2014</u>	<u>0.96</u>	<u> </u>
<u>2013</u>	<u>1.04</u>	<u> </u>

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:

- YES ☒ NO Contractor has received a willful violation issued by OSHA or New York City Department of Buildings (NYCDOB) within the last three years.
- YES ☒ NO Contractor has had an incident requiring OSHA notification within 8 hours (all work-related fatalities) or an incident requiring OSHA notification within 24 hours (all work-related inpatient hospitalizations, all amputations and all losses of an eye).

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
<u>2015</u>	<u>40000</u>	<u>0</u>
<u>2014</u>	<u>28000</u>	<u>8</u>
<u>2013</u>	<u>30000</u>	<u>6.7</u>

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

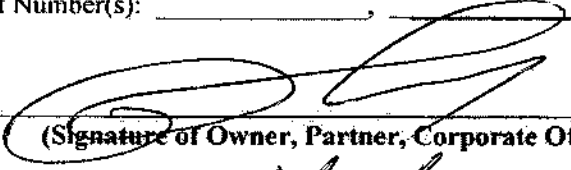
5. Safety Performance on Previous DDC Project(s)

☐ YES ☒ NO Contractor previously audited by the DDC Office of Site Safety.
DDC Project Number(s): _____

☐ YES ☒ NO Accident on previous DDC Project(s).
DDC Project Number(s): _____

☐ YES ☒ NO 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].
DDC Project Number(s): _____

Date: 1/14/16

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

Title: President

BID BOND 1
FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS. That we, ZHL Group Inc.

hereinafter referred to as the "Principal", and The Guarantee Company of North America USA

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 (10%) Percent of amount bid

(\$10% of amount), 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 _____

furnish all labor and materials necessary and required for: New Construction of FDNY Firehouse for Rescue 2

Project ID: F175RES2

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 8th day of January, 2016.

(Seal)

ZHL Group Inc. (L.S.)

Principal

By:

Yevgeniy Lvovskiy, President

(Seal)

The Guarantee Company of North America USA

Surety

By:

Paul Kushner, Attorney-in-Fact

STATE OF New York

COUNTY OF Nassau

S.S.:

On this 8th

day of January

2016

, before me personally came

PAUL KUSHNER

to me known, who, being by me duly sworn, did

depose and say: that (s)he resides in SOUTHAMPTON, NEW YORK that (s)he is Attorney-in-Fact of the Corporation described in and which executed the attached instrument; that (s)he know the seal of said Corporation, that the seal affixed to said instrument is such corporate seal; that it was so affixed pursuant to power conferred on her/him by a Power of Attorney granted to her/him by said Corporation and that (s)he signed said instrument as Attorney-in-Fact of said Corporation pursuant to such authority.

KAREN M. PICCIANO

NOTARY PUBLIC-STATE OF NEW YORK

No. 01PI6201036

Qualified in Nassau County

My Commission Expires February 09, 2017

INDIVIDUAL ACKNOWLEDGMENT

STATE OF _____

S.S.:

COUNTY OF _____

On this _____

day of _____

, before me personally came

to me known and known to me to be the individual

described in and who executed the foregoing instrument, and (s)he acknowledged to me that (s)he executed the same.

NOTARY PUBLIC

PRINCIPAL'S CORPORATE ACKNOWLEDGMENT

STATE OF New York

COUNTY OF Kings

S.S.:

On this 11th

day of January

2016

, before me personally came

to me known, who, being by me duly sworn, did

depose and say, that (s)he resides in Staten Island New York; that (s)he is President of SKL Group Inc. the Corporation described in and which executed the foregoing instrument; that (s)he knows the Corporate Seal of said Corporation; and the Seal affixed to said instrument is such Corporate Seal; that it was so affixed by order of the Board of Directors of said Corporation; and that (s)he signed her/his name thereto by like order.

MARIA KIM

NOTARY PUBLIC-STATE OF NEW YORK

No. 01KI6208783

Qualified in Kings County

PRINCIPAL'S CORPORATE ACKNOWLEDGMENT

MARIA KIM

NOTARY PUBLIC-STATE OF NEW YORK

No. 01KI6208783

Qualified in Kings County

My Commission Expires July 13, 2017

STATE OF _____

S.S.:

COUNTY OF _____

On this _____

day of _____

, before me personally came

a member of the Co-partnership of

to me known and known to me to be the person

who is described in the foregoing instrument and (s)he acknowledges that (s)he executed the same as and for the act and deed of the said Co-partnership.

NOTARY PUBLIC

THE GUARANTEE COMPANY OF NORTH AMERICA USA

Home Office, Southfield, Michigan

STATUTORY BALANCE SHEET

December 31, 2014

ASSETS

Cash and Short-Term Investments	\$ 47,679,979
Marketable Securities	143,314,160
Premium and Agents Balances (under 90 days)	4,093,819
Reinsurance Receivable on paid losses	1,099,947
Accrued Interest and Dividends	791,907
Other Assets	<u>624,837</u>
Total Admitted Assets	<u>\$197,604,649</u>

LIABILITIES

Reserve for Losses and Loss Adjustment Expenses	\$ 6,121,295
Unearned Premium Reserve	13,620,611
Accrued Expenses	1,909,439
Ceded Reinsurance Premiums Payable	936,756
Taxes, Licenses and Fees Payable	132,382
Net Deferred Tax Liability	2,084,050
Funds Held	6,210,635
Other Liabilities	<u>316,593</u>
Total Liabilities	<u>\$ 31,331,761</u>

CAPITAL AND SUPPLUS

Common Stock and Paid-In Capital	\$144,020,970
Surplus	<u>22,251,918</u>
Total Policyholders' Surplus	<u>\$166,272,888</u>
Total Liabilities, Capital and Surplus	<u>\$197,604,649</u>

State of Michigan
County of Oakland

Stephen C. Ruschak being duly sworn, says: That he is the President & COO of The Guarantee Company of North America USA; that said company is a corporation duly organized, existing, and engaged in business as a surety by virtue of the laws of the State of Michigan, and has duly complied with all the requirements of the laws of said state applicable to said company and is duly qualified to act as surety under such laws; that said company has also complied with and is duly qualified to act as surety under the Act of Congress of July 30, 1947, as amended (6 U.S.C. 6-13); that the foregoing is a full, true and correct statement of the financial condition of said company on the 31st day of December 2014.

Sworn to before me this 27th day of February 2015.

Cynthia A. Takal
Notary

Stephen C. Ruschak
Stephen C. Ruschak, President & COO

Cynthia A. Takal
Notary Public, State of Michigan
County of Oakland
My Commission Expires February 27, 2018
Acting in Oakland County

**CERTIFICATE OF SOLVENCY UNDER SECTION 1111 OF THE NEW
YORK INSURANCE LAW**

**STATE OF NEW YORK
DEPARTMENT OF FINANCIAL SERVICES**

It is hereby certified that

**The Guarantee Company of North America USA
Of Southfield, Michigan**

a corporation organized under the laws of the State of Michigan and duly authorized to transact the business of insurance in this State, is qualified to become surety or guarantor on all bonds, undertakings, recognizances, guaranties and other obligations required or permitted by law; and that the said corporation is possessed of a capital and surplus including gross paid-in and contributed surplus and unassigned funds (surplus) aggregating the sum of \$166,272,887 (Capital \$4,000,008) as is shown by its sworn financial statement for the year ending December 31, 2014 on file in this Department, prior to audit.

The said corporation cannot lawfully expose itself to loss on any one risk or hazard to an amount exceeding 10% of its surplus to policyholders, unless it shall be protected in excess of that amount in the manner provided in Section 4118 of the Insurance Law of this State.



In Witness Whereof, I have

unto set my hand and affixed

official seal of this Department
in the City of Albany, this 12th
day of June 2015.

**Benjamin M. Lawskey
Superintendent of Insurance**

By

Jacqueline Catalfamo

**Jacqueline Catalfamo
Special Deputy Superintendent**



THE GUARANTEE COMPANY OF NORTH AMERICA USA

Southfield, Michigan

POWER OF ATTORNEY

KNOW ALL BY THESE PRESENTS: That THE GUARANTEE COMPANY OF NORTH AMERICA USA, a corporation organized and existing under the laws of the State of Michigan, having its principal office in Southfield, Michigan, does hereby constitute and appoint

Paul Kushner, Deborah Belton
Asset Indemnity Brokerage Corp.

its true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise.

The execution of such instrument(s) in pursuance of these presents, shall be as binding upon THE GUARANTEE COMPANY OF NORTH AMERICA USA as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at the principal office.

The Power of Attorney is executed and may be certified so, and may be revoked, pursuant to and by authority of Article IX, Section 9.03 of the By-Laws adopted by the Board of Directors of THE GUARANTEE COMPANY OF NORTH AMERICA USA at a meeting held on the 31st day of December, 2003. The President, or any Vice President, acting with any Secretary or Assistant Secretary, shall have power and authority:

1. To appoint Attorney(s)-in-fact, and to authorize them to execute on behalf of the Company, and attach the Seal of the Company thereto, bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof; and
2. To revoke, at any time, any such Attorney-in-fact and revoke the authority given, except as provided below
3. In connection with obligations in favor of the Florida Department of Transportation only, it is agreed that the power and authority hereby given to the Attorney-in-Fact includes any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts required by the State of Florida Department of Transportation. It is fully understood that consenting to the State of Florida Department of Transportation making payment of the final estimate to the Contractor and/or its assignee, shall not relieve this surety company of any of its obligations under its bond.
4. In connection with obligations in favor of the Kentucky Department of Highways only, it is agreed that the power and authority hereby given to the Attorney-in-Fact cannot be modified or revoked unless prior written personal notice of such intent has been given to the Commissioner - Department of Highways of the Commonwealth of Kentucky at least thirty (30) days prior to the modification or revocation.

Further, this Power of Attorney is signed and sealed by facsimile pursuant to resolution of the Board of Directors of the Company adopted at a meeting duly called and held on the 6th day of December 2011, of which the following is a true excerpt:

RESOLVED that the signature of any authorized officer and the seal of the Company may be affixed by facsimile to any Power of Attorney or certification thereof authorizing the execution and delivery of any bond, undertaking, contracts of indemnity and other writings obligatory in the nature thereof, and such signature and seal when so used shall have the same force and effect as though manually affixed.



IN WITNESS WHEREOF, THE GUARANTEE COMPANY OF NORTH AMERICA USA has caused this instrument to be signed and its corporate seal to be affixed by its authorized officer, this 23rd day of February, 2012.

THE GUARANTEE COMPANY OF NORTH AMERICA USA

STATE OF MICHIGAN
 County of Oakland

Stephen C. Ruschak, Vice President

Randall Musselman, Secretary

On this 23rd day of February, 2012 before me came the individuals who executed the preceding instrument, to me personally known, and being by me duly sworn, said that each is the herein described and authorized officer of The Guarantee Company of North America USA; that the seal affixed to said instrument is the Corporate Seal of said Company; that the Corporate Seal and each signature were duly affixed by order of the Board of Directors of



Cynthia A. Takai
 Notary Public, State of Michigan
 County of Oakland
 My Commission Expires February 27, 2018
 Acting in Oakland County

IN WITNESS WHEREOF, I have hereunto set my hand at The Guarantee Company of North America USA offices the day and year above written.

I, Randall Musselman, Secretary of THE GUARANTEE COMPANY OF NORTH AMERICA USA, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by THE GUARANTEE COMPANY OF NORTH AMERICA USA, which is still in full force and effect.



IN WITNESS WHEREOF, I have thereunto set my hand and attached the seal of said Company this 8th day of January 2016

Randall Musselman, Secretary

**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

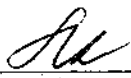
Yevgeniy Lvovskiy

PRINTED NAME

President

TITLE

Sworn to before me this
01 day of Jan, 20 16



Notary Public

Dated: 01/14/16

MARIA KIM
NOTARY PUBLIC-STATE OF NEW YORK
No. 01KI6208783
Qualified in Kings County
My Commission Expires July 13, 2017

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

December 24, 2015

ADDENDUM No. # 1

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

F175RES2

New Construction of FDNY Firehouse for Rescue 2

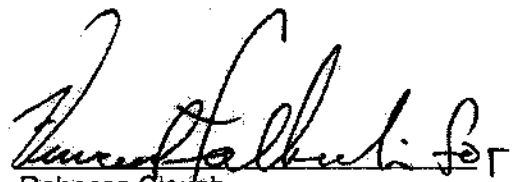
This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **Bidders Questions and Responses to Questions:**
See Attachment A.
2. **Revisions to the Drawings:**
See Attachment B.

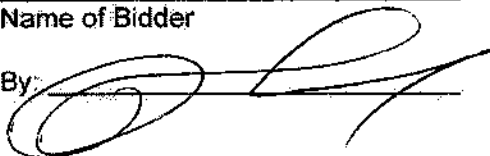
THIS ADDENDUM MUST BE SIGNED BY ALL BIDDERS AND ATTACHED TO THEIR BIDS.

If additional information is required, please contact the Department of Design and Construction, Contract Section at (718) 391-3170, (718) 391-1016, or by fax at (718) 391-2615.


Rebecca Clough
Assistant Commissioner
Courts/ Correctional Institutions/
Health Facilities

ZHL GROUP, INC
Name of Bidder

By:



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

January 7, 2016

ADDENDUM No. # 2

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

F175RES2

New Construction of FDNY Firehouse for Rescue 2

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:

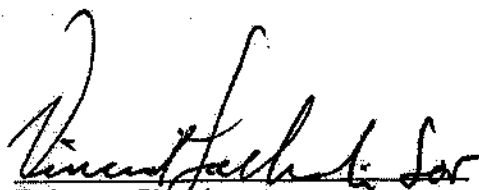
1. The Bid Opening for the contract described below scheduled for January 6, 2016, at 2:00 pm is rescheduled to January 14, at 2:00 pm.

Contract #1 – General Construction Work

2. Questions from Bidders and Responses to Questions:
See Attachment A.
3. Revisions to the Addendum to the General Conditions:
See Attachment B.
4. Revisions to the Specifications:
See Attachment C.
5. Revisions to the Drawings:
See Attachment D.

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) 391-3170, (718) 391-1016, or by fax at (718) 391-2615.


Rebecca Clough
Assistant Commissioner
Courts/ Correctional Institutions/
Health Facilities


Name of Bidder

By 

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

January 12, 2016

ADDENDUM No. # 3

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

F175RES2

New Construction of FDNY Firehouse for Rescue 2

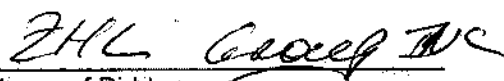
This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

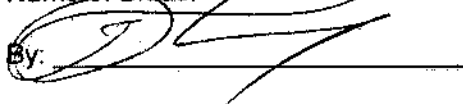
The bidder is advised that the items listed below apply to the project:

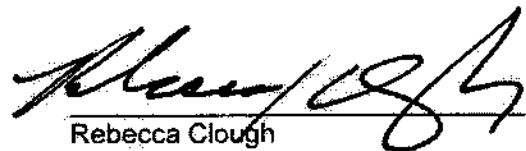
1. **Questions from Bidders and Responses to Questions:**
See Attachment A.
2. **Revisions to the Bid Booklet:**
See Attachment B.
3. **Revisions to the Addendum to the General Conditions:**
See Attachment C.
3. **Revisions to the Specifications:**
See Attachment D.
4. **Revisions to the Drawings:**
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) 391-3170, (718) 391-1016, or by fax at (718) 391-2615.


Name of Bidder

By: 


Rebecca Clough
Assistant Commissioner
Courts/ Correctional Institutions/
Health Facilities

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 *New Construction of FONY Firehouse for Rescue 2* and located at *1815 Sterling Pl. Bklyn 11233* (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 Contractors (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: 3/22/06


(Name of CM, GC, Higher Level Subcontractor)

ZHL Group, Inc.

(Name of Contractor or subcontractor)

Yevgeniy Goushiy, President

(Contractor or (Authorized Officer & Title)

2383 McDonald Ave, Brooklyn, NY 11220

(Address)

718-331-2807, 718-331-2808

(Phone) (Fax)

Contractor's State License # (below)

NYC DOB #31001

Sworn to before me this 22nd day of March 2006

MARIA KIM

NOTARY PUBLIC-STATE OF NEW YORK

No. 01K16208783

Qualified in Kings County

My Commission Expires July 13, 2017

Execution Version

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.

- **COMPLIANCE WITH HIRENYC AND REPORTING REQUIREMENTS:** The Hiring and Employment Rider shall apply to contracts valued at \$1 million or more for all goods, services and construction except human services contracts that are subject to the Public Assistance Hiring Commitment Rider. The Rider describes the Hire NYC process and obligations, including reporting requirements throughout the life of the contract. The Hire NYC process requires contractors to enroll with the Hire NYC system within thirty days after the registration of the contract subject to this solicitation, to provide information regarding all entry to mid-level job opportunities arising from this contract and located in New York City, and to agree to interview qualified candidates from HireNYC for those opportunities. The Rider also includes reporting requirements unrelated to HireNYC.

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**

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PROJECT ID: F175RES2

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

BID BOOKLET

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

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)
- Schedule B: M/WBE 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)
- Any Addenda issued prior to the receipt of bids

**FAILURE TO SUBMIT THE EIGHT 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 the bidder has any questions or requires additional information, please contact the Department of Design and Construction by phone (718-391-2601) or by fax (718-391-2615).
 - (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 Notice to Bidders – Proprietary Items

- A. General: A proprietary item required for the Project is specified below. The contractor is required to provide and install such proprietary item. The Contractor must provide the specified item from the designated manufacturer. Substitutions are not permissible and will not be approved. More detailed information regarding the item is set forth in the Specifications. Such information includes item description, as well as requirements for installation and related materials.
- B. Payment: For the required proprietary item, an allowance amount is indicated. The allowance provides a stipulated amount to reimburse the Contractor for the purchase of the proprietary item from the designated manufacturer. Payment from the allowance shall be limited to the purchase price of the specified proprietary item and shall exclude any costs above and beyond the purchase price. Payment from the allowance shall not include any of the following costs with respect to the specified proprietary item: (1) any mark-up for the Contractor's overhead and profit, (2) any costs for transportation, including delivery, shipping or special handling costs, (3) any costs for installation, and (4) any costs for related materials. Payment for the specified proprietary item shall be based on the invoice actually provided by the manufacturer.
- C. Bid Form: A total allowance amount for the purchase of all required proprietary items is set forth on the Bid Form. In preparing the lump sum portion of its bid, the Contractor shall:
- (1) Exclude from its bid any costs for the purchase of the proprietary items, and
 - (2) Include in its bid any costs above and beyond the purchase price, including without limitation, costs for transportation, delivery, installation, related materials and overhead.
- D. Required Proprietary Item(s):

CONTRACT NO. 1:

- | | |
|-----------------------------|---|
| 1. Proprietary Item: | Sectional Overhead Garage Doors |
| Specification Section: | 08 3616 – Sectional Overhead Garage Doors |
| Manufacturer: | Fimbel Door Corporation, Model SI-2024A (Distributed by Thompson Overhead Door Co., Inc.) |
| Allowance Amount: | Not to Exceed \$153,000 |
| | |
| 2. Proprietary Item: | Nederman Exhaust Rail and Fan System |
| Specification Section: | 23 6450 HVAC Equipment; Drawings: M-101 M-102, M-103, M-114 |
| Manufacturer: | Nederman (Distributed by Air Purifiers Inc.) |
| Allowance Amount: | Not to Exceed \$77,510 |

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SPECIAL EXPERIENCE REQUIREMENTS

Special Experience Requirements apply as indicated below.

Bidder(s):	General Construction	<input checked="" type="checkbox"/> X	YES	<input type="checkbox"/> NO
Specific Areas of Work:	General Construction	<input checked="" type="checkbox"/> X	YES	<input type="checkbox"/> NO
Manufacturer(s):	General Construction	<input checked="" type="checkbox"/> X	YES	<input type="checkbox"/> NO

- (A) **EXPERIENCE REQUIREMENTS FOR THE BIDDER:** The special experience requirements set forth below apply to the bidder(s) indicated above. Compliance with such special experience requirements will be determined solely by the City prior to an award of contract. Failure to comply with the special experience requirements will result in the rejection of the bid as non-responsive.
- 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.
- (B) **QUALIFICATION FORM:** For each project submitted to demonstrate compliance with the special experience requirements, the bidder(s) indicated above must complete the Qualification Form included in the Bid Booklet. The City will only evaluate a project if the following criteria are met: (1) the project is described on the Qualification Form, and (2) all information on the Qualification Form is provided. The City will not evaluate any project which does not comply with the criteria set forth herein, including any project which is referred to only on the resume of an individual.
- (C) **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.
- 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. If the bidder is relying on the prior experience of a principal or employee, it must submit documentation confirming the position held by such principal or employee in the prior entity, as well as in the bidding entity.
 - 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.
- (D) **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.
- (E) **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 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, its 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 contractor or subcontractor that will perform specific areas of work specified in the section(s) set forth below.

General Construction

- Section 013126: BIM Protocol
- Section 031000: Concrete Formwork
- Section 032000: Concrete Reinforcement and Embedded Assemblies
- Section 033000: Cast-in-Place Concrete
- Section 034100: Precast Structural Concrete
- Section 074170: Terracotta Rainscreen Tile Cladding System
- Section 075323: Ethylene-Propylene-Diene-Monomer Roofing (EPDM)
- Section 075400: Thermoplastic Membrane Roofing
- Section 075563: Green Roof Assembly
- Section 084013: Fire-Rated Glazed Walls
- Section 084413: Glazed Aluminum Curtain Walls

- (2) Special experience requirements applicable to the contractor or subcontractor who will perform specific areas of work are summarized below. Such experience requirements are set forth in full in the Addendum to the General Conditions.

a. The contractor or subcontractor that will perform the specific areas of work specified above (except for Sections 013126, 074170, 075323, 075400 and 075563) 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. For Section 013126, the contractor or subcontractor that will perform the specific area of work specified above must have the following qualifications:

- Minimum 3 years of experience in 3D Modeling construction Models for projects of the same size and complexity, coordination between subcontractors and design team, and managing of virtual design and construction process.
- Technical knowledge of Virtual design and Construction methodologies and BIM application used, related systems and network infrastructure, and awareness of new technologies.
- Versed in LOD 2014 and National BIM standards v3.

c. For Roofing Sections 074170, 075323, 075400 and 075563, the contractor or subcontractor performing the work of these sections must be a company regularly engaged in performing roofing projects with its own workforce and have successfully completed in a timely fashion at least three (3) roofing projects similar in scope, size and type to the required work within the last three (3) consecutive years prior to the bid opening. At least one of those projects must have been performed within the last twelve (12) months. The three (3) qualifying projects must have utilized one or more of the roofing systems specified for the project being bid herein, been installed by the contractor's or subcontractor's company utilizing its own workforce and must have qualified for, and have been issued, the warranty provided by the manufacturer of the roofing system. In addition, the contractor or subcontractor must be a certified or authorized installer for at least one of the manufacturer's roofing systems specified herein and shall submit proof of same.

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

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

b. For Roofing Sections 074170, 075323, 075400 and 075563, the contractor or subcontractor must specify, for each qualifying project submitted, the type of roofing system utilized and provide proof that the manufacturer's warranty for that project was issued. The City will only evaluate a project if the following criteria are met: (1) the project is described on the Qualification Form, and (2) all information required to be provided by the contractor or subcontractor on the Qualification Form is actually provided. The City will not evaluate any project which does not comply with the criteria set forth herein, including any project which is referred to only on the resume of an individual.

(F) **EXPERIENCE REQUIREMENTS FOR MANUFACTURER(S)**: The special experience requirements set forth below apply to the manufacturer(s) 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.

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

General Construction

- Section 032000: Concrete Reinforcement and Embedded Assemblies
- Section 034100: Precast Structural Concrete
- Section 074170: Terracotta Rainscreen Tile Cladding System
- Section 084013: Fire-Rated Glazed Walls
- Section 084413: Glazed Aluminum Curtain Walls

- (2) Special experience requirements applicable to the manufacturer(s) of specified material or equipment are summarized below. Such experience requirements are set forth in full in the Addendum to the General Conditions.

- 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. In addition, for Precast Structural Concrete, the manufacturer must be certified by the PreCast Institute (PCI).

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Qualification Form

Project ID: F175RES2

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: _____

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MWBE PROGRAM

M/WBE UTILIZATION PLAN

M/WBE Program Requirements: The requirements for the M/WBE Program are set forth on the following pages of this Bid Booklet, in the section entitled "Notice to All Prospective Contractors".

Schedule B: M/WBE Utilization Plan: Schedule B: M/WBE Utilization Plan for this Contract is set forth in this Bid Booklet on the pages following the section entitled "Notice to All Prospective Contractors". The M/WBE 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 an M/WBE Utilization Plan (Part II) with its bid.

Waiver: The bidder may seek a full or partial pre-award waiver of the Participation Goals in accordance with the "Notice to All Prospective Contractors" (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 Participation Goals is set forth in the M/WBE Utilization Plan (Part III).

Rejection of the Bid: The bidder must complete Schedule B: M/WBE Utilization Plan (Part II) set forth in this Bid Booklet on the pages following the section entitled "Notice to All Prospective Contractors". A Schedule B submitted by the bidder which does not include the Vendor Certification and Required Affirmations (See Section V of Part II) will be deemed to be non-responsive, unless a full waiver of the Participation Goals is granted (Schedule B, Part III). In the event that the City determines that the bidder has submitted a Schedule B where the Vendor Certification and Required Affirmations are completed but other aspects of the Schedule B are not complete, or contain a copy or computation error that is at odds with the Vendor Certification and Required Affirmations, 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 Schedule B 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 Participation Goals have been established for the participation of M/WBEs, 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.

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NOTICE TO ALL PROSPECTIVE CONTRACTORS

PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED BUSINESS ENTERPRISES IN CITY PROCUREMENT

ARTICLE I. M/WBE PROGRAM

Local Law No. 129 of 2005 added and Local Law 1 of 2013 amended Section 6-129 of the Administrative Code of the City of New York (hereinafter "Section 6-129"). Section 6-129 establishes the program for participation in City procurement ("M/WBE Program") by minority- owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs"), certified in accordance with Section 1304 of the New York City Charter. As stated in Section 6-129, the intent of the program is to address the impact of discrimination on the City's procurement process, and to promote the public interest in avoiding fraud and favoritism in the procurement process, increasing competition for City business, and lowering contract costs. The contract provisions contained herein are pursuant to Section 6-129, and the rules of the Department of Small Business Services ("DSBS") promulgated thereunder.

If this Contract is subject to the M/WBE Program established by Section 6-129, the specific requirements of MBE and/or WBE participation for this Contract are set forth in Schedule B of the Contract (entitled the "M/WBE Utilization Plan"), and are detailed below. The Contractor must comply with all applicable MBE and WBE requirements for this Contract.

All provisions of Section 6-129 are hereby incorporated in the Contract by reference and all terms used herein that are not defined herein shall have the meanings given such terms in Section 6-129. Article I, Part A, below, sets forth provisions related to the participation goals for construction, standard and professional services contracts. Article I, Part B, below, sets forth miscellaneous provisions related to the M/WBE Program.

PART A

PARTICIPATION GOALS FOR CONSTRUCTION, STANDARD AND PROFESSIONAL SERVICES CONTRACTS OR TASK ORDERS

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

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

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

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

A Contractor that is a qualified joint venture (as defined in Section 6-129(c)(30)) shall be permitted to count a percentage of its own participation toward fulfillment of the relevant **Participation Goal**. In accordance with Section 6-129, the value of Contractor's participation shall be determined by subtracting from the total value of the Contract or Task Order, as applicable, any amounts that Contractor pays to direct subcontractors, and then multiplying the remainder by the percentage to be applied to total profit to

determine the amount to which an MBE or WBE is entitled pursuant to the joint venture agreement, provided that where a participant in a joint venture is certified as both an MBE and a WBE, such amount shall be counted either toward the goal for MBEs or the goal for WBEs, but not both.

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

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

(ii) **Participation Goals** on a Master Services Agreement will be established for individual Task Orders issued after the Master Services Agreement is awarded. If **Participation Goals** have been established on a Task Order, a contractor shall be required to submit a Schedule B – M/WBE Utilization Plan For Independently Registered Task Orders That Are Issued Pursuant to Master Services Agreements, Part II (see Pages 2-4) indicating: (a) whether the contractor is an MBE or WBE, or qualified joint venture; (b) the percentage of work it intends to award to direct subcontractors; and (c) in cases where the contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end. The contractor must engage in good faith efforts to meet the **Participation Goals** as established for the Task Order unless Agency has granted the contractor a pre-award waiver of the Participation Goals in accordance with Section 6-129 and Part A, Section 10 below.

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

5. Where an M/WBE Utilization Plan has been submitted, the Contractor shall, within 30 days of issuance by Agency of a notice to proceed, submit a list of proposed persons or entities to which it intends to award subcontracts within the subsequent 12 months. In the case of multi-year contracts, such list shall also be submitted every year thereafter. The Agency may also require the Contractor to report periodically about the contracts awarded by its direct subcontractors to indirect subcontractors (as defined in Section 6-129(c)(22)).

PLEASE NOTE: If this Contract is a public works project subject to GML §101(5) (i.e., a contract valued at or

below \$3M for projects in New York City) or if the Contract is subject to a project labor agreement in accordance with Labor Law §222, and the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades (plumbing and gas fitting; steam heating, hot water heating, ventilating and air conditioning (HVAC); and electric wiring), the Contractor must identify all those to which it intends to award construction subcontracts for any portion of the Wicks trade work at the time of bid submission, regardless of what point in the life of the contract such subcontracts will occur. In identifying intended subcontractors in the bid submission, bidders may satisfy any Participation Goals established for this Contract by proposing one or more subcontractors that are MBEs and/or WBEs for any portion of the Wicks trade work. In the event that the Contractor's selection of a subcontractor is disapproved, the Contractor shall have a reasonable time to propose alternate subcontractors.

6. MBE and WBE firms must be certified by DSBS in order for the Contractor to credit such firms' participation toward the attainment of the **Participation Goals**. Such certification must occur prior to the firms' commencement of work. A list of MBE and WBE firms may be obtained from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6356, 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. A firm that is certified as both an MBE and a WBE may be counted either toward the goal for MBEs or the goal for WBEs, but not both. No credit shall be given for participation by a graduate MBE or graduate WBE, as defined in Section 6-129(c)(20).

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

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

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

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

(b) To apply for a full or partial waiver of the **Participation Goals**, a bidder, proposer, or contractor, as applicable, must complete Part III (Page 5) of Schedule B and submit such request no later than seven (7) calendar days prior to the date and time the bids, proposals, or Task Orders are due, in writing to the Agency by email at zhangji@ddc.nyc.gov or via facsimile at (718) 391-1886. Bidders, proposers, or contractors, as applicable, who have submitted requests will receive an Agency response by no later than two (2) calendar days prior to the due date for bids, proposals, or Task Orders; provided, however, that if that date would fall on a weekend or holiday, an Agency response will be provided by close-of-business on the business day before such weekend or holiday date.

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

(d) Agency may grant a full or partial waiver of the Participation Goals to a bidder, proposer or contractor, as applicable, who demonstrates—before submission of the bid, proposal or Task Order, as applicable—that it has legitimate business reasons for proposing the level of subcontracting in its M/WBE Utilization Plan. In making its determination, Agency shall consider factors that shall include, but not be limited to, whether the bidder, proposer or contractor, as applicable, has the capacity and the bona fide intention to perform the Contract without any subcontracting, or to perform the Contract without awarding the amount of subcontracts represented by the Participation Goals. In making such determination, Agency may consider whether the M/WBE Utilization Plan is consistent with past subcontracting practices of the bidder, proposer or contractor, as applicable, whether the bidder, proposer or contractor, as applicable, has made efforts to form a joint venture with a certified firm, and whether the bidder, proposer, or contractor, as applicable, has made good faith efforts to identify other portions of the Contract that it intends to subcontract.

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

- (i) The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;
- (ii) The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;
- (iii) The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;
- (iv) The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the M/WBE Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;
- (v) The Contractor held meetings with MBEs and/or WBEs prior to the date their bids or proposals were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids or proposals were solicited;
- (vi) The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;
- (vii) Timely written requests for assistance made by the Contractor to Agency's M/WBE liaison officer and to DSBS;
- (viii) Description of how recommendations made by DSBS and Agency were acted upon and an explanation of why action upon such recommendations did not lead to the desired level of participation of MBEs and/or WBEs.

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

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

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

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

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

PART B: MISCELLANEOUS

1. The Contractor shall take notice that, if this solicitation requires the establishment of an **M/WBE** Utilization Plan, the resulting contract may be audited by DSBS to determine compliance with Section 6-129. See §6-129(e)(10). Furthermore, such resulting contract may also be examined by the City's Comptroller to assess compliance with the **M/WBE** Utilization Plan.
2. Pursuant to DSBS rules, construction contracts that include a requirement for an **M/WBE** Utilization Plan shall not be subject to the law governing Locally Based Enterprises set forth in Section 6-108.1 of the Administrative Code of the City of New York.
3. DSBS is available to assist contractors and potential contractors in determining the availability of MBEs and/or WBEs to participate as subcontractors, and in identifying opportunities that are appropriate for participation by MBEs and/or WBEs in contracts.
4. Prospective contractors are encouraged to enter into qualified joint venture agreements with MBEs and/or WBEs as defined by Section 6-129(c)(30).
5. By submitting a bid or proposal the Contractor hereby acknowledges its understanding of the **M/WBE** Program requirements set forth herein and the pertinent provisions of Section 6-129, and any rules promulgated thereunder, and if awarded this Contract, the Contractor hereby agrees to comply with the **M/WBE** Program requirements of this Contract and pertinent provisions of Section 6-129, and any rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract. The Contractor hereby agrees to make all reasonable, good faith efforts to solicit and obtain the participation of MBEs and/or WBEs to meet the required **Participation Goals**.

ARTICLE II. ENFORCEMENT

1. If Agency determines that a bidder or proposer, as applicable, has, in relation to this procurement, violated Section 6-129 or the DSBS rules promulgated pursuant to Section 6-129, Agency may disqualify such bidder or proposer, as applicable, from competing for this Contract and the Agency may revoke such bidder's or proposer's prequalification status, if applicable.
2. Whenever Agency believes that the Contractor or a subcontractor is not in compliance with Section 6-129 or the DSBS rules promulgated pursuant to Section 6-129, or any provision of this Contract that implements Section 6-129, including, but not limited to any **M/WBE** Utilization Plan, Agency shall send a written notice to the Contractor describing the alleged noncompliance and offering the Contractor an opportunity to be heard. Agency shall then conduct an investigation to determine whether such Contractor or subcontractor is in compliance.
3. In the event that the Contractor has been found to have violated Section 6-129, the DSBS rules promulgated pursuant to Section 6-129, or any provision of this Contract that implements Section 6-129, including, but not limited to, any **M/WBE** Utilization Plan, Agency may determine that one of the following actions should be taken:
 - (a) entering into an agreement with the Contractor allowing the Contractor to cure the violation;
 - (b) revoking the Contractor's pre-qualification to bid or make proposals for future contracts;
 - (c) making a finding that the Contractor is in default of the Contract;
 - (d) terminating the Contract;
 - (e) declaring the Contractor to be in breach of Contract;
 - (f) withholding payment or reimbursement;
 - (g) determining not to renew the Contract;
 - (h) assessing actual and consequential damages;

- (i) assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the M/WBE Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;
- (j) exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or
- (k) taking any other appropriate remedy.

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

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

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

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

Tax ID #: _____

APT E-

PIN#: 85016B0048

Contract # 1 - General Construction Work

SCHEDULE B - M/WBE Utilization Plan**Part I: M/WBE Participation Goals**

Part I to be completed by contracting agency

Contract Overview

APT E-Pin # 85016B0048 FMS Project ID#: F175RES2
 Project Title/Agency FDNY New Firehouse for Rescue 2
 PIN # 8502016FI0002C
 Bid/Proposal
 Response Date: January 6, 2016
 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 Negrón Title MWBE Liaison & Compliance Analyst
 Telephone # (718) 391-1502 Email negronn@ddc.nyc.gov

Project Description (attach additional pages if necessary)

Located in the Brownsville neighborhood of Brooklyn, the new firehouse is intended to become a tool for instruction, enabling the Company to stage and simulate a wide range of emergency conditions in, on, and around the building. The building's primary structure and enclosure consist of precast concrete panels and poured concrete floors. To enhance the Company's training, the new firehouse is organized around a large interior void, a space that extends from the ground to roof level. The void enables the team to practice rescue scenarios that mimic conditions common to the city, using its height and associated elements of balconies, bridge, doorways, ladders, and stairs. On the exterior, red glazed terracotta panels surround a smaller-scale series of voids—windows and doors—with highly crafted details animating these points of connection between the firehouse and the community it serves. A green roof, geothermal HVAC system, and solar hot-water heating system reduce energy use, lowering the building's carbon footprint.

M/WBE Participation Goals for Services

Enter the percentage amount for each group or for an unspecified goal. Please note that there are no goals for Asian Americans in Professional Services.

Prime Contract Industry: Construction

Group	Percentage	
<u>Unspecified *</u>	<u>17</u>	<u>%</u>
or		
Black American	<u>Unspecified</u>	<u>%</u>
Hispanic American	<u>Unspecified</u>	<u>%</u>
Asian American	<u>Unspecified</u>	<u>%</u>
Women	<u>Unspecified</u>	<u>%</u>
Total Participation Goals	17	%

Line 1

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

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Tax ID #:

APT E-

PIN#:

85016B0048

SCHEDULE B - Part II: M/WBE Participation Plan

Part II to be completed by the bidder/proposer:

Please note: For Non-M/WBE Prime Contractors who will NOT subcontract any services and will self-perform the entire contract, you must obtain a FULL waiver by completing the Waiver Application on pages 9 and 9a and timely submitting it to the contracting agency pursuant to the Notice to Prospective Contractors. Once a FULL WAIVER is granted, it must be included with your bid or proposal and you do not have to complete or submit this form with your bid or proposal.

Section I: Prime Contractor Contact Information

Tax ID #

FMS Vendor ID #

Business Name

Contact Person

Address

Telephone #

Email

Section II: M/WBE Utilization Goal Calculation: Check the applicable box and complete subsection.**PRIME CONTRACTOR ADOPTING AGENCY M/WBE PARTICIPATION GOALS**

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

Calculate the total dollar value of your total bid that you agree will be awarded to M/WBE subcontractors for services and/or credited to an M/WBE prime contractor or Qualified Joint Venture.

Please review the Notice to Prospective Contractors for more information on how to obtain credit for M/WBE participation.

Total
Bid/Proposal
ValueAgency Total
Participation Goals
(Line 1, Page 6)Calculated M/WBE
Participation Amount

\$

X

=

\$
Line 2**PRIME CONTRACTOR OBTAINED PARTIAL WAIVER APPROVAL: ADOPTING MODIFIED M/WBE PARTICIPATION GOALS**

☐ For Prime Contractors (including Qualified Joint Ventures and M/WBE firms) adopting Modified M/WBE Participation Goals.

Calculate the total dollar value of your total bid that you agree will be awarded to M/WBE subcontractors for services and/or credited to an M/WBE prime contractor or Qualified Joint Venture.

Please review the Notice to Prospective Contractors for more information on how to obtain credit for M/WBE participation.

Total
Bid/Proposal
ValueAdjusted
Participation Goal
(From Partial Waiver)Calculated M/WBE
Participation Amount

\$

X

=

\$
Line 3

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

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

☐ MBE ☐ WBE

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

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

Section IV: General Contract Information

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

Enter brief description of the type(s) and dollar value of subcontracts for all any services you plan on subcontracting if awarded this contract. For each item, indicate whether the work is designated for participation by MBEs and/or WBEs and the time frame in which such work is scheduled to begin and end. Use additional sheets if necessary.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____

✓ **Scopes of Subcontract Work**

Section V: Vendor Certification and Required Affirmations

I hereby:

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

Signature _____

Date _____

Print Name _____

Title _____

SCHEDULE B – PART III – REQUEST FOR WAIVER OF M/WBE PARTICIPATION REQUIREMENT

Contract Overview

Tax ID # _____ FMS Vendor ID # _____
 Business Name _____
 Contact Name _____ Telephone # _____ Email _____
 Type of Procurement ☐ Competitive Sealed Bids ☐ Other Bid/Response Due Date _____
 APT E-PIN # (for this procurement): _____ Contracting Agency: _____

M/WBE Participation Goals as described in bid/solicitation documents

%

Agency M/WBE Participation Goal

Proposed M/WBE Participation Goal as anticipated by vendor seeking waiver

%

of the total contract value anticipated in good faith by the bidder/proposer to be subcontracted for services and/or credited to an M/WBE Prime Contractor or Qualified Joint Venture.

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

☐ Vendor does not subcontract services, and has the capacity and good faith intention to perform all such work itself with its own employees.

☐ Vendor subcontracts some of this type of work but at a lower % than bid/solicitation describes, and has the capacity and good faith intention to do so on this contract. (Attach subcontracting plan outlining services that the vendor will self-perform and subcontract to other vendors or consultants.)

☐ Vendor has other legitimate business reasons for proposing the M/WBE Participation Goal above. Explain under separate cover.

References

List 3 most recent contracts performed for NYC agencies (if any). Include information for each subcontract awarded in performance of such contracts. Add more pages if necessary.

CONTRACT NO.	AGENCY	DATE COMPLETED
Total Contract Amount \$	Total Amount Subcontracted \$	
Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract
CONTRACT NO.	AGENCY	DATE COMPLETED
Total Contract Amount \$	Total Amount Subcontracted \$	
Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract
CONTRACT NO.	AGENCY	DATE COMPLETED
Total Contract Amount \$	Total Amount Subcontracted \$	
Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract

List 3 most recent contracts performed for other entities. Include information for each subcontract awarded in performance of such contracts. Add more pages if necessary.

(Complete ONLY if vendor has performed fewer than 3 New York City contracts.)

TYPE OF Contract	ENTITY	DATE COMPLETED
Manager at entity that hired vendor (Name/Phone No./Email)		
Total Contract Amount \$	Total Amount Subcontracted \$	
Type of Work Subcontracted		

TYPE OF Contract	AGENCY/ENTITY	DATE COMPLETED
Manager at agency/entity that hired vendor (Name/Phone No./Email)		
Total Contract Amount \$	Total Amount Subcontracted \$	
Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract

TYPE OF Contract	AGENCY/ENTITY	DATE COMPLETED
Manager at entity that hired vendor (Name/Phone No./Email)		
Total Contract Amount \$	Total Amount Subcontracted \$	
Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract	Item of Work Subcontracted and Value of subcontract

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 CONTRACTING OFFICER APPROVAL

Signature: _____

Date: _____

CLIENT/PROCUREMENT OFFICER APPROVAL

Signature: _____

Date: _____

Waiver Determination

Full Waiver Approved ☐

Waiver Denied ☐

Partial Waiver Approved ☐

Revised Participation Goals _____ %

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

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

PROJECT ID: F175RES2

**New Construction of FDNY Firehouse for Rescue 2
1815 Sterling Place
Brooklyn, 11233**

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: _____

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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:

10. **M/WBE UTILIZATION PLAN:** By signing its bid, the bidder agrees to the Vendor Certification and Required Affirmations set forth below, unless a full waiver of the Participation Goals is granted. The Vendor Certification and Required Affirmations will be deemed to satisfy the requirement to complete Section V of Part II of Schedule B: M/WBE Utilization Plan.

Section V: Vendor Certification and Required Affirmations:

I hereby:

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

BID FORM

PROJECT ID: F175RES2

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
Material Sold and
Delivered

Total Price For
Labor

\$ _____ +

\$ _____

Total Price for Item A= \$ _____

- B. **AMOUNT** for Proprietary Items (pages 2a)

\$ _____

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

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

- * **SUBCONTRACTOR IDENTIFICATION:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (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

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

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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 completed 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.

All listed subcontractors must be used to perform the work identified on this form for the amount listed. The listed subcontractors are not alternatives to each other. The list of subcontractors is to be submitted in a separate sealed envelope by completing the form 'Bidders Identification of Subcontractors' for 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 complete this form using its own name.

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 Schedule B (Subcontractor Utilization Plan), the bid will be non-responsive unless the bidder requests and obtains a Waiver of Target Subcontracting Percentage (Schedule B, Part III) in advance of bid submission. Failure to submit the completed 'BIDDERS IDENTIFICATION OF SUBCONTRACTORS' form that includes the names of subcontractors and the agreed upon amounts to be paid to such subcontractors will render the bid non-responsive.

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: F175RES2

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:**

Description of Plumbing Work:

(Print Name)

Agreed amount to be paid Subcontractor: \$ _____

2. **HVAC CONTRACTOR:**

Description of HVAC Work:

(Print Name)

Agreed amount to be paid Subcontractor: \$ _____

3. **ELECTRICAL CONTRACTOR:**

Description of Electrical Work:

(Print Name)

Agreed amount to be paid Subcontractor: \$ _____

BIDDER'S SIGNATURE: The Bidder must sign and complete this form in the spaces provided below:

(Bidder's Signature)

(Print Name)

(Address)

(Title)

(Phone #)

(Fax#)

(Date)

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

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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.

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	CONTRACT 1 - GENERAL CONSTRUCTION WORK							
01 0000	GENERAL REQUIREMENTS							
01 3126	GENERAL REQUIREMENTS Mobilization Security Guards		LS LS					
	Subtotal							
02 0000	EXISTING CONDITIONS							
02 0110	PROTECTION OF EXISTING CONDITIONS Remove concrete sidewalk Sawcut & remove road pavement full depth Miscellaneous protection		SF SF LS					
	Subtotal							
02 1000	PROTECTION OF EXISTING UTILITIES Protect existing utilities		LS					
	Subtotal							
03 0000	CONCRETE							
03 1000	CONCRETE FORMWORK (included w/ section 033000)							
03 2000	CONCRETE REINFORCEMENT AND EMBEDDED ASSEMBLIES (Included w/ section 033000)							
03 3000	CAST-IN-PLACE CONCRETE 24 x 24 CIP columns 10" Elevator Pit wall 12" CIP area way wall		EA CY CY					

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Department of
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Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
03 3511	12" CIP shear wall		CY					
	10" CIP		SF					
	10" 2 WAY CIP		SF					
	Subtotal							
	CONCRETE FLOOR FINISHES							
03 4001	Polished Concrete Flooring		SF					
	Clear concrete sealer (PT-3) @ Cellar floors		SF					
	Subtotal							
03 4001	PRECAST CONCRETE AMENITIES (included w/ section 034100)							
03 4100	PRECAST STRUCTURAL CONCRETE							
03 4100	Column footing		CY					
	Foundation wall footing		CY					
	Areaway foundation wall footing		CY					
	Fence footing		CY					
	Fence curb @ East & West		CY					
	9" precast lagging		CY					
	Soldier pile		CY					
	Concrete corbel @ 2nd floor/Roof		LF					
	Concrete curb below insulated panel S432/2		LF					
	Stair foundation wall		CY					
	12" Foundation wall		CY					
	12" Wing wall		LF					
	10" wall @ 3rd fl.		CY					
	8" high concrete curb below CMU walls		LF					
	Concrete curb under planters		LF					

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	6" SOG		SF					
	6" concrete slab w/6" polystyrene @ Areaway		SF					
	12" slab @Cellar Fuel Tank RM		SF					
	24" high curb @Cellar Fuel Tank RM		LF					
	Stair slab/footing (5'h step)		SF					
	11" flat slab & 3-6 topping slab incl. stud rail		SF					
	8" hollow core & 2" topping		SF					
	1-6 x 20" high dbl T & 2"NWC topping		SF					
	8-0 x 22" high dbl T & 2"NWC topping		SF					
	8-0 x 24" high dbl T & 2"NWC topping		SF					
	12" raised platf. w/ polystyrene @ Entry lvl 2		SF					
	Polystyrene @ elevator pit		CY					
	18" raised platf. w/ polystyrene @ Entry lvl 2		SF					
	1-6 h step @ SW Patio		SF					
	7" concrete pad		SF					
	4" concrete pad		SF					
	6" platform @ lvl 1Noth/South		SF					
	Grade beam		CF					
	Precast concrete beam		CY					
	Precast concrete beam @ SKY LT		CY					
	Beam above wing wall 4-0 x 1-0		LF					
	Concrete Stair 1 - CIP (Basement to Roof)		FLT					
	Concrete Stair 3 @ Basement		FLT					
	Concrete Stair 3 @ fl. 1/2		FLT					
	Miscellaneous concrete		LS					
	Precast Architectural Concrete: CONC -1 structural precast concrete insulated sandwich panel @ facade		SF					
	Subtotal							

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04 0000	MASONRY							
04 2000	UNIT MASONRY							
	Masonry		SF					
	2hr fire rated walls		SF					
	3hr fire rated walls		SF					
	Plaster @ Patio 1/2/Stair 3		SF					
	Subtotal							
05 0000	METALS							
05 1200	STRUCTURAL STEEL							
	Facade structural steel		TON					
	L4 x 4 x 3/8 @ perimeter (S440/1)		TON					
	Plates @ perimeter (S440/1 assume 12lb)		TON					
	Structural frame @ Sky It		TON					
	Moment connection @ South facade above OH doors		EA					
	Shear studs @ columns		EA					
	Terra cotta CORBEL frame		LF					
	Miscellaneous structural steel		LS					
	Metal deck under Stair 3		SF					
	Subtotal							
05 4000	COLD FORMED METAL FRAMING (included w/ section 051200)							
05 5000	METAL FABRICATIONS							
	Metal Stair incl. Handrail @ Stair 3		FLT					
	Catwalk @ Level 2 s.stl.		SF					
	Ladder		EA					
	Aluminum panels @ facade		SF					

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
05 5213	Metal panels @ Decon Bollards @ South		SF					
			EA					
	PIPE AND TUBE RAILINGS							
	H.rail @ Training Balcony		LF					
	H.rail @ North/South roof patio		LF					
05 5306	U shape pipe @ Stair Patio		EA					
	Subtotal							
	METAL GRATINGS AND FLOOR PLATES							
06 0000 06 1000	Painted metal grating top of Areaway		SF					
	Subtotal							
	WOOD, PLASTICS, AND COMPOSITES							
06 4200	ROUGH CARPENTRY							
	Miscellaneous wood blocking		SF					
	Subtotal							
06 4200	INTERIOR ARCHITECTURAL WOODWORK							
	Finish carpentry:							
	Built-in wooden bench at locker room		LF					
	Steel and wood Work bench @ First Level		LF					
	WD shelving on top of butcher block work surface at shop area		LF					
	Mill work desk @ company office 8'X3' (5/A804)		LF					
	Mill work table @ company office 9'-5"X4' (9/A804)		LF					
06 4200	Mill work niche @ company office; incld shiving and top framing (11/A804)		LF					

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	Butcher block work surface at shop area + WD shelving on top (2) rows		LF					
	Wooden shelving (under counter top desk)		LF					
	Wood panels		SF					
	Subtotal							
07 0000	THERMAL AND MOISTURE PROTECTION							
07 1113	BITUMINOUS DAMPPROOFING							
	Waterproof elev. Pit		SF					
	Asphalt dampproofing @ foundation wall		SF					
	Waterproofing vapor barrier @ SOG		SF					
	Subtotal							
07 2100	THERMAL INSULATION							
	2" insulation @ 4' H foundation wall		SF					
	Insulation @ terra cotta		SF					
	Subtotal							
07 2150	SPRAYED-ON CELLULOSIC THERMAL INSULATION							
	Spray foam insulation @ façade		SF					
	Subtotal							
07 2160	CONTINUOUS INSULATION WALL PANELS							
	Aluminum panels @ façade		LS					
	Subtotal							
07 2500	WEATHER BARRIERS							
	Gutters & downspout		LF					
	Subtotal							

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07 4170	TERRACOTTA RAINSCREEN TILE CLADDING SYSEM							
	Terra cotta (material)		LS					
	Miter cuts		LS					
	Ridged terracotta tile CT2		SF					
	Terracotta tile CT3		SF					
	FDNY sign		SF					
	Subtotal							
07 5323	ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)							
	Membrane roofing: built up roofing		SF					
	Subtotal							
07 5400	THERMOPLASTIC MEMBRANE ROOFING							
	Thermoplastic Membrane Roofing @ Stair 1		SF					
	Subtotal							
07 5563	GREEN ROOF ASSEMBLY							
	Green roof (including Pre grown sedum mat mix types A,B,C at Roof)		SF					
	No plant zone w/gravel @ Roof		CY					
	RF-2 Concrete pavers on pedestals		SF					
	Subtotal							
07 6200	SHEET METAL FLASHING AND TRIM							
	Perimeter condition incl. metal coping		LF					
	Subtotal							

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
07 7100	ROOF SPECIALTIES Gutters & downspout		LF					
	Subtotal							
07 7200	ROOF ACCESSORIES (included w/ other Division 7 sections)							
07 8410	THROUGH-PENETRATION FIRESTOP SYSTEMS Firestopping Spray fireproofing		LS LS					
	Subtotal							
07 8420	FIRE-RESISTIVE JOINT SYSTEMS (included w/ other Division 7 sections)							
07 9005	JOINT SEALERS Control joints @ Cellar Miscellaneous caulking		LF SF					
	Subtotal							
08 0000	OPENINGS							
08 1113	HOLLOW METAL DOORS AND FRAMES Single 3 hr fire rated vision glass (7.5"X60") Double		EA EA EA PR					
	Subtotal							
08 1416	FLUSH WOOD DOORS Single		EA					

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	vision glass (7'5"X60") Double		EA					
	Subtotal		PR					
08 3100	ACCESS DOORS AND PANELS Access doors							
	Subtotal							
08 3323	OVERHEAD COILING DOORS Overhead Coiling Doors		EA					
	Subtotal							
08 3616	SECTIONAL OVERHEAD GARAGE DOORS OH Doors - electric operated: (including 24-0 x 13-6 and 14-0 x 13-6)		LS					
	Subtotal							
08 4013	FIRE-RATED GLAZED WALLS GL-5 1 hr. FIRE RATED @ Training Tower lvl 2 & Stair		SF					
	Subtotal							
08 4313	ALUMINUM-FRAMED STOREFRONTS AL/GL Doors, frames & hardware: Single; Full glass panel 1 hr fire rated Alumn Doors and frames & hardware: Single		EA					
	Subtotal		EA					
08 4413	GLAZED ALUMINUM CURTAIN WALLS (included w/ other Division 8 sections)							

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
08 6300	METAL-FRAMED SKYLIGHTS GL-4 custom laminated sealed insulating glass units low e @ Sky It roof		SF					
	Subtotal							
08 7100	DOOR HARDWARE (included w/ other Division 8 sections)							
08 8000	GLAZING GL-1 1" IG-1 low E ctg w/o ceramic frit GL-2 1" IG-1 low E ctg w ceramic frit GL-6 @ Kitchen /Dng GL-7 1" Clear insulated glass unit, Tempered @ Kitchen /conference room GL-9 1/2" thick laminated interior glazing, tempered @ fitness and company office Clerestory Side lights @ Patio Transom @ Patio Side lights @ Interior Transom @ Interior Motorized Awning window @ north and south elev		SF SF SF SF SF SF EA EA EA EA EA					
	Subtotal							
08 8300	MIRRORS Mirrors		EA					
	Subtotal							
08 9100	LOUVERS Louvers		SF					
	Subtotal							

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Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
09 0000	FINISHES							
09 2116	GYPSUM BOARD ASSEMBLIES							
	GWB and metal stud system - rated (Shaft Wall)		SF					
	GWB and metal stud system - non rated		SF					
	GWB furring @ inside perimeter		SF					
	GWB ceilings		SF					
	Subtotal							
09 2236.23	METAL LATH (included w/ other Division 9 sections)							
09 2400	PORTLAND CEMENT PLASTERING							
	AC-1 @ company office and fitness		SF					
	Subtotal							
09 3000	TILING							
	Ceramic tile base		LF					
	Ceramic wall tiles		SF					
	Saddle		EA					
	Subtotal							
09 5153	DIRECT-APPLIED ACOUSTICAL CEILINGS							
	AC -1 @ 201 & 206		SF					
	Subtotal							
09 5453	LINEAR METAL CEILINGS							
	Painted metal slat ceiling system -MTL9		SF					
	Subtotal							

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09 6429	WOOD STRIP AND PLANK FLOORING							
	Wood Flooring WD1		SF					
	Wood Base		LF					
	Subtotal							
09 6500	RESILIENT WALL BASE							
	Rubber Base		LF					
	Subtotal							
09 6566	RESILIENT ATHLETIC FLOORING							
	Rubber Tiles RB-2 @ health/fitness		SF					
	Subtotal							
09 9000	PAINTING AND COATING							
	Prep & paint ceilings at GWB		SF					
	Prep & paint walls at GWB		SF					
	Prep & paint walls at CMU		SF					
	Prep & paint walls at exposed structural concrete walls		SF					
	Painting for Doors & Frames		EA					
	Paint exposed ceilings		SF					
	Clear sealer @ concrete sandwich panel façade		SF					
	Paint beams @ Sky light		LF					
	Paint lantern frame @ Sky light		EA					
	Miscellaneous finishes		SF					
	Wall Finishes:							
	Cork Wallcovering @ Lounge		SF					
	Peg board		SF					
	Subtotal							

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
10 0000	SPECIALTIES							
10 1101	VISUAL DISPLAY BOARDS							
	Display board		EA					
	Subtotal							
10 1400	SIGNAGE							
	Exterior signage		LS					
	Interior signage		LS					
	Workshop shelves		LF					
	Subtotal							
10 2113.13	METAL TOILET COMPARTMENTS							
	Toilet partitions		EA					
	Urinal screens		EA					
	Subtotal							
10 2601	WALL AND CORNER GUARDS							
	Wall and corner guards		LS					
	Subtotal							
10 2700	SLIDE POLE							
	Flagpoles		EA					
	FDNY pole		EA					
	Subtotal							
10 4400	FIRE PROTECTION SPECIALTIES							
	Fire extinguisher		EA					
	Subtotal							

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
10 5100	LOCKERS							
	Metal lockers - 2 x 2		EA					
	24"x20" Gear grid lockers, 6' high		EA					
	24"x20" Gear grid lockers, 6' high mobile		EA					
	Miscellaneous Equipment:							
	Steel and wood Work bench @ First Level		LF					
	Metal Racks @ Lumber Storage		EA					
	Rivet Lock Shelving 36x24x84		EA					
	Rivet Lock Shelving 48x18x84		EA					
	E-Rack bulk storage system 72x24x96		EA					
	E-Rack bulk storage system 96x24x96		EA					
	Flammable liquid Safety Storage cabinet		EA					
	Padded bench 36"x80" @ house watch : 6.5ft		EA					
10 7500	Metal cabinet at shop area , decon area		LF					
	Ram Air 6-place bunker gear heated dryer @ Cellar		EA					
	Subtotal							
	FLAGPOLES							
	Flagpoles		EA					
	Subtotal							
11 0000 11 4000	EQUIPMENT							
	FOODSERVICE EQUIPMENT							
	Custom counter, 6" back splash, bottom shelf & 2 drawers		LF					
	S.stl island		LF					
	Double sinks		EA					
	Faucet & heavy duty gooseneck sprayer		EA					
	Refrigerator/freezer		EA					
	Gas range		EA					

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12 0000 12 2400	Dishwasher		EA					
	Microwave		EA					
	Ice maker		EA					
	Shelving - wire		EA					
	Pot rack		EA					
	Exhaust hood		EA					
	Fire suppression		EA					
	Subtotal							
12 0000 12 2400	FURNISHINGS							
	WINDOW SHADES							
	Mecho Shade (or equal) sheer, window shade, manual WT-1		SF					
	Mecho Shade (or equal) black-out window shade, manual WT-2		SF					
	Subtotal							
12 3600	COUNTERTOPS							
	WD counter top surface w/ shelving @ conference rm		LF					
	WD counter top surface @ study room		LF					
	Wooden counter top		LF					
	Subtotal							
12 9333	MANUFACTURED PLANTERS							
	Exterior equipment:							
	Dumpsters		EA					
	Storage cages		EA					
	Subtotal							

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14 0000	CONVEYING EQUIPMENT							
14 2100	ELECTRIC TRACTION ELEVATORS Elevator w/ 3 stops		EA					
	Subtotal							
21 0000	FIRE SUPPRESSION							
21 0511	COMMON WORK RESULTS FOR FIRE PROTECTION							
	Painting exposed pipes & existing siamese connections		LS					
	Cutting, patching, sleeves & seals		LS					
	Seismic Restraints		LS					
	Testing and commissioning		LS					
	Siamese Connection		EA					
	Subtotal							
21 1313	AUTOMATIC SPRINKLER SYSTEM							
	Wet-Pipe Sprinkler system:							
	Wet Sprinkler Heads		EA					
	4" Sch. 40 Blk Steel Pipe, grooved fittings, hangers		LF					
	3"		LF					
	2 1/2"		LF					
	2"		LF					
	1 1/2"		LF					
	1 1/4"		LF					
	1"		LF					
	2" Sch. 40 Galvanized Pipe, grooved fittings, hangers		LF					
	Floor Control Valve Assembly		EA					
	4" Valves		LS					
	4" Alarm Check Valve		EA					
	Connection to the pipe		EA					

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Dry-Pipe Sprinkler system: Dry Sprinkler Heads 1" Sch. 40 Galvanized Pipe, grooved fittings, hangers 4" Dry pipe valve Fire Pump and Jockey Pump Subtotal		EA LF EA LS					
22 0000	PLUMBING							
22 0511	COMMON WORK RESULTS FOR PLUMBING							
	Rigging		HRS					
	Cutting, patching, sleeves & seals		LS					
	Excavation and back fill		CY					
	Subtotal							
22 0513	PLUMBING TESTS							
	Testing and commissioning		HRS					
	Subtotal							
22 0514	MOTORS AND MOTOR CONTROLLERS (included w/ other Division 22 sections)							
22 0523	GENERAL DUTY VALVES FOR PLUMBING PIPING							
	Mixing valve		EA					
	3" RPZ		EA					
	1 1/2" RPZ		EA					
	4" DCVA		EA					
	Other Valves		EA					
	Subtotal							

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

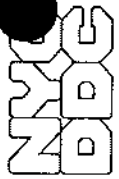
Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
22 0711	PLUMBING INSULATION							
	Domestic water pipe Insulation		LF					
	Storm water pipe Insulation		LF					
	Subtotal							
22 1000	WATER DISTRIBUTION PIPING							
	Domestic Water Piping, Cold and Hot water supply and return:		LF					
	3" Copper "L" pipe and fittings		LF					
	2"		LF					
	1 1/2"		LF					
	1 1/4"		LF					
	1"		LF					
	3/4"		LF					
	1/2"		LF					
	Connection to the pipe		EA					
	Water meter		EA					
	Subtotal							
22 1300	SANITARY, WASTE, AND STORM DRAINAGE							
	Underground Sanitary Waste and Vent System Piping:							
	4" Single hub cast iron pipe and fittings		LF					
	Above Ground Sanitary Waste and Vent System Piping:							
	4"		LF					
	3"		LF					
	2"		LF					
	1 1/2"		LF					
	Clean out		LF					
	3" Floor drain		LF					
	4" Floor drain		LF					

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CONTRACTOR'S BID BREAKDOWN FORM

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Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

DDC ID: F175RES2
Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	4" Area drain		LF					
	4" CODP		LF					
	6" Deck drain		LF					
	3" Deck drain		LF					
	6" House trap		EA					
	Connection to the pipe		EA					
	SEJ-11 1, Duplex Sewage Ejector Pump		EA					
	2" Pump discharge pipe, fittings, hangers		LF					
	Facility Storm Drainage:							
	8" Cast iron pipe and fittings		LF					
	6"		LF					
	4"		LF					
	3"		LF					
	4" CO Storm drain		EA					
	6" CO Storm drain		EA					
	8" CO Storm drain		EA					
	8" House trap		EA					
	Connection to the pipe		EA					
	4" OD/RD		EA					
	ESP-LL/1 Elevator Sump Pump, 1/5 HP, 50 gpm		EA					
	Subtotal							
22 3000	PLUMBING EQUIPMENT AND ACCESSORIES							
	Pumps:							
	Hot Water Recirculation pump RP-1&2		EA					
	Water Duplex Booster pump		EA					
	SEJ-11 1, Duplex Sewage Ejector Pump		EA					
	ESP-LL/1 Elevator Sump Pump, 1/5 HP, 50 gpm		EA					
	Electric Domestic Water Heater:							

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Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Solar Water Heating system (including 30 Tube Solar collector and Solar storage tanks, 120 Gals)		LOT					
	Hot Water Expansion tank, EX-1		EA					
	Toilet Accessories:							
	36" HC S.Stl. Grab bar		EA					
	42" HC S.Stl. Grab bar		EA					
	Tissue dispenser		EA					
	Hand Dryer		EA					
	Shower Curtain, Rod, Hook		EA					
	Coat hook		EA					
	Drink fountain		EA					
	JC accessories		LS					
	Subtotal							
22 4000	PLUMBING FIXTURES							
	P 1A&B Water closet		EA					
	P-3 Urinal		EA					
	P-2A Lavatory		EA					
	P-6 Janitor Closet Sinks		EA					
	P-5 Pantry Sink		EA					
	P-4 Shower		EA					
	Eye Wash station		EA					
	3/4" Non Freeze wall Hydrant		EA					
	3/4" Non Freeze Ground Hydrant		EA					
	3/4" Water supply control box		EA					
	Subtotal							

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNV Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNV

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
23 0000	HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)							
23 0500	COMMON WORK RESULTS FOR HVAC							
	Rigging, Hoisting and Scaffolding		HRS					
	Excavation, Bedding and Backfill for Geothermal		CY					
	Cleaning, identification and tagging		LS					
	Subtotal							
23 0513	COMMON MOTOR REQUIREMENTS FOR HVAC							
	Hydronic Pumps:							
	GWP-1&2, Geothermal Pump, 51 GPM, 5 HP		EA					
	HWP-1&2, Hot water inline pump, 31 GPM		EA					
	DBP-1&2, Hot water inline pump, 6 GPM		EA					
	FPP-1, Freeze protection pump, 9 GPM		EA					
	VFD for Pumps (Furnish only)		HP					
	AS-1&2 Inline Air & Dirt Separator		EA					
	ET-1 Expansion tank 211 Gallon		EA					
	ET-1 Expansion tank 370 Gallon		EA					
	HVAC Fans:							
	GX-1, ATS Room Exhaust Fan 275 CFM, 1/6 HP		EA					
	GX-2, Gas Tank Room Fan 350 CFM, 1/6 HP		EA					
	GX-3, Gear Room Exhaust Fan 150 CFM, 1/6 HP		EA					
	AX-1, Apparatus Bay Fan Exhaust Fan 10000 CFM, 3 HP		EA					
	AX-2, Apparatus Bay Exhaust Fan 10000 CFM, 3 HP		EA					
	DX-1, Dryer Exhaust Fan 300 CFM, 1/6 HP		EA					
	General Duty Valves For HVAC Piping: equipment pipe connection		LS					
	Subtotal							

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
23 0548	VIBRATION & SEISMIC CONTROL FOR HVAC Seismic Restraints		LS					
	Subtotal							
23 0593	TESTING, ADJUSTING & BALANCING FOR HVAC Testing, adjusting, balancing		HRS					
	Subtotal							
23 0700	HVAC INSULATION HW/CHW/Glycol piping: Fiber glass Insulation Refrigerant piping: Fiberglass Insulation Condensate Drain Piping: Fiberglass Insulation Duct insulation: FG Insulation CS Insulation		LF LF LF SF SF					
	Subtotal							
23 0900	INSTRUMENTATION & CONTROL FOR HVAC Control points Programming, software, front end		EA LS					
	Subtotal							
23 0994	SPARK DETECTION SYSTEM Control panel & sensor		LS					
	Subtotal							

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
23 1000	FUEL GAS SYSTEM							
	Gas meter		EA					
	Gas Booster pump		EA					
	3" Carbon Steel Sch 40 threaded piping		LF					
	2"		LF					
	1 1/2"		LF					
	1 1/4"		LF					
	Gas pressure regulator		EA					
	Connection to the pipe		EA					
	Subtotal							
23 2113	PIPING AND ACCESSORIES							
	Geothermal piping:							
	1 1/4" geothermal HDPE pipe and fittings		LF					
	Steam and condensate piping and pumps:							
	Condensate pipe and fittings		LF					
	Refrigerant Piping:							
	1 1/8" ACR pipe and fittings		LF					
	3/4"		LF					
	5/8"		LF					
	1/2"		LF					
	3/8"		LF					
	1/4"		LF					
	Vibration & Seismic control		LS					
	HW/CHW/Glycol piping:							
	2 1/2" HW/CHW/Glycol Sch 40 pipe and fittings		LF					
	2"		LF					
	1 1/2"		LF					
	1 1/4"		LF					

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Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
23 2500	HVAC WATER TREATMENT GF-1 Glycol feeder system Chemical treatment	1"	LF					
		3/4"	LF					
		1/2"	LF					
		Subtotal						
23 3113	METAL DUCTS GI duct Black Steel duct Boiler Intake and Exhaust duct, double wall 4" dia, galvanized Boiler Exhaust duct, double wall 4" dia, galvanized Duct Accessories: Louver Fire smoke damper Fire damper Volume Damper Vibration & Seismic control		EA					
			LS					
			LBS					
			LBS					
23 3117	ACOUSTICAL TREATMENT Liner		LF					
			LF					
			SF					
			SF					
23 3117	ACOUSTICAL TREATMENT Liner		SF					
			EA					
			LS					
		Subtotal						
23 3117	ACOUSTICAL TREATMENT Liner		SF					
		Subtotal						

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Project: New Construction of FDNV Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: F175RES2
Sponsor Agency: FDNV

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
23 3500	SPECIAL EXHAUST DC-1, Dust collection system DC-2 Dust collector		EA EA					
	Subtotal							
23 3713	DIFFUSERS, REGISTERS & GRILLES Linear Diffuser Supply Ceiling Diffuser 12x12 Supply Grill 10x6 Return Ceiling Diffuser 12x12 Exhaust/Return register 12x12 Exhaust/Return register 10x10 Exhaust/Return register 8x8 Exhaust/Return register 12x6 Exhaust/Return register 10x6		LF EA EA EA EA EA EA EA EA					
	Subtotal							
23 3813	KITCHEN-RANGE HOOD KX-1, Kitchen Hood Exhaust Fan 1500 CFM, 1/2 HP		EA					
	Subtotal							
23 6450	HVAC EQUIPMENT Engine Exhaust System: NE-1, tail Pipe Exhaust Fan 4200 CFM, Nederman Exhaust system Condensing boiler: B-1,2,3,4 Gas fired Boilers 210 MBH Fuel-Fired Furnaces: DF-1 Furnace 250 MBH		EA EA EA					

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Department of Design and Construction

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Fixed-Plate Air to Air Energy Recovery Equipment: ERV-1 Energy recovery unit 1400 CFM		EA					
	Packaged Outdoor Heating only Makeup-Air units: KX-MUA Kitchen Make up Air Unit 1200 CFM		EA					
	Indoor Central-Station Air-Handling unit: HV-1, Heating and Ventilating Unit 1200 CFM, 1.5 HP		EA					
	Split system Air -Conditioners: SS-1 Ductless split AC, 18 MBH		EA					
	SS-2 Ductless split AC, 36 MBH		EA					
	COND-2 Condensing unit, 54 MBH		EA					
	Water Source Unitary heat pump: FC-1 Ducted Split Heat Pump 24.2 MBH		EA					
	FC-2 Ducted Split Heat Pump 9.5 MBH		EA					
	FC-3 Ducted Split Heat Pump 57.6 MBH		EA					
	FC-4 Ducted Split Heat Pump 9.6 MBH		EA					
	FC-5 Ducted Split Heat Pump 45.7 MBH		EA					
	FC-6 Ducted Split Heat Pump 9.6 MBH		EA					
	FC-7 Ducted Split Heat Pump 15.3 MBH		EA					
	FC-8 Ducted Split Heat Pump 45.7 MBH		EA					
	FC-9 Ducted Split Heat Pump 19.2 MBH		EA					
	FC-10 Ducted Split Heat Pump 45.7 MBH		EA					
	FC-11 Ducted Split Heat Pump 19.2 MBH		EA					
	BB-1 Brach control Box		EA					
	BB-2 Brach control Box		EA					
	BB-3 Brach control Box		EA					
	COND-1 Condensing unit, 192 MBH		EA					
	Unit Heaters: UH-A, Hot water 72.5 MBH		EA					
	UH-B, Hot water 13 MBH		EA					

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	UH-C, Hot water 38 MBH		EA					
	UH-E, Hot water 16 MBH		EA					
	UH-F, Electric Unit Heater 5 KW Radiators		EA					
	Air Compressor: C-1 Air Compressor 5 HP		EA					
	Subtotal							
23 9900	GEO THERMAL WELL FIELD Geothermal wells 450 Ft deep Manifold Header		EA EA					
	Subtotal							
26 0000	ELECTRICAL							
26 0500	COMMON WORK RESULTS FOR ELECTRICAL (included w/ other Division 26 sections)							
26 0519	BASIC MATERIALS AND METHODS Lighting Circuitry: 3/4" Emt, 4#12 MC Cable 3/4" Rigid, 4#12		LF LF LF					
	Subtotal							
26 0533	EMPTY CONDUIT SYSTEMS (included w/ other Division 26 sections)							
26 0548	SEISMIC SUPPORTS RESTRAINTS AND ATTACHMENT (included w/ other Division 26 sections)							

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
26 0971	LIGHTING CONTROLS Lighting Controls & Cktry		SF					
	Subtotal							
26 2400	ELECTRICAL SERVICE SYSTEM							
	Receptacles		EA					
	Receptacle Quad		EA					
	EMTR		EA					
	Photocell		EA					
	Control Station -3-Button		EA					
	Warning Bell 120v		EA					
	Receptacle GFI WP		EA					
	Cord & Reel Receptacle		EA					
	Receptacle 20/2 Twist-Lock		EA					
	Break Glass Station WP		EA					
	Subtotal							
26 2416	ELECTRICAL DISTRIBUTION SYSTEM							
	3/4" Emt, 4#12		LF					
	3/4" Rigid, 4#10		LF					
	1" Rigid, 4#6		LF					
	1" Rigid, Controls		LF					
	1 1/4" Rigid, 4#4		LF					
	1 1/4" Rigid, 4#2		LF					
	2" Rigid, 4 1/0		LF					
	2" Rigid, 4 3/0		LF					
	3 1/2" Rigid, 4 500 Mcm		LF					
	#8 MI Cable		LF					
	#6 MI Cable		LF					
	Subtotal							

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CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
26 2923	ELECTRICAL POWER EQUIPMENT							
	100 Amp Panel Board		EA					
	125 Amp Panel Board		EA					
	225 Amp Panel Board		EA					
	400 Amp Panel Board		EA					
	800 Amp Main Distr Board		EA					
	TVSS @ Distr Board		EA					
	Manual Snap Switch Starter, 20/1 Disc		EA					
	Manual Snap Switch Starter WP		EA					
	20/2 Amp Disconnect		EA					
	30 Amp Disconnect		EA					
	60 Amp Disconnect		EA					
	100 Amp Disconnect Elev		EA					
	Elev CP Terms		EA					
	Con Ed Utility Fees		LS					
	800 Amp Service End Box		EA					
	800 Amp CT Cabinet		EA					
	800 Amp Service Disconnect		EA					
	200 Amp Service Disconnect		EA					
	30 Amp Disconnect @ UPS		EA					
	60 Amp Disconnect @ UPS		EA					
	Install Door Oper FBO		EA					
	Install Nema 0 Starter FBO		EA					
	Install Nema 1 Starter FBO		EA					
	Install 5-10 HP VFD FBO		EA					
	Install 10HP VFD FBO		EA					
	Install Fire Pump CP FBO		EA					
	10 Kva UPS		EA					

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Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Hood Exhaust Interlock, Shutdown wiring		LS					
	Subtotal							
26 3214	EMERGENCY POWER SYSTEM GASEOUS TYPE ENGINE							
	250 Kw Emergency Generator		EA					
	Autotransfer Sw 30A		EA					
	Autotransfer Sw 800A		EA					
	125 Kw Load Bank		EA					
	800 Amp Enclosed Ckt Brkr		EA					
	Autotransfer Sw 60A		EA					
	Autotransfer Sw 100A		EA					
	Electronic Submetering		EA					
	60 Amp Encl Ckt Brkr		EA					
	100 Amp Encl Ckt Brkr		EA					
	Generator WP/Sound Encl		EA					
	Rigging		LS					
	Subtotal							
26 4100	LIGHTNING PROTECTION SYSTEM							
	Service Grounding		LS					
	Subtotal							
26 4313	SURGE PROTECTION DEVICES							
	Surge Protector		EA					
	Main Ground Bar		EA					
	Eqpt Ground		EA					
	Small Ground Bus		EA					
	Ground Fault Protection Module		EA					
	Subtotal							

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Department of
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Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
26 5100	LIGHTING EQUIPMENT LAMPS AND BALLASTS							
	Type F1, 1a		EA					
	Type F1EM		EA					
	Type F2		EA					
	Type F2AL		EA					
	Type F3		EA					
	Type F3AL		EA					
	Type F3ALEM		EA					
	Type F3A		EA					
	Type F3AEM		EA					
	Type F3AAL		EA					
	Type F3B		EA					
	Type F3BEM		EA					
	Type F3BAL		EA					
	Type F3C		EA					
	Type F3CAL		EA					
	Type F8A		EA					
	Type F11		EA					
	Type F11AL		EA					
	Type F11ALEM		EA					
	Type F12		EA					
	Type F13		EA					
	Type F14		EA					
	Type F14A		EA					
	Type F15		EA					
	Type F17		EA					
	Type FX1		EA					
	Type FX3		EA					
	Type FX4		EA					

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**Department of
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CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

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Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Type FX6EM		EA					
	Type FX1EM		EA					
	Type FX7		EA					
	Exit		EA					
	Type F4		LF					
	Type F4AL		LF					
	Type F4A		LF					
	Type F4ALEM		LF					
	Type F5		LF					
	Type F5AL		LF					
	Type F6		LF					
	Type F7		LF					
	Type F7A		LF					
	Type F7AL		LF					
	Type F10		LF					
	Type F10AL		LF					
	Type F16EM		LF					
	Type FX5		LF					
	Temp Power and Lighting		LS					
	Subtotal							
26 6000	ACCESS DOORS IN GENERAL CONSTRUCTION (included w/ section 083100)							
26 9000	MODULAR SOLAR PHOTOVOLTAIC SYSTEM							
	3/4" Emt, 4#12		LF					
	3/4" Emt, 2#8 DC		LF					
	3/4" Emt, #6		LF					
	3/4" Emt, 2#6 DC		LF					

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Department of
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Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	3/4" Emt, #2		LF					
	1" Emt, #3/0		LF					
	PV Panel, 230W		EA					
	Micro Inverter		EA					
	Combiner Box		EA					
	Install Small CP		EA					
	Autotransfer Sw 30A		EA					
	30/2 Amp Disconnect		EA					
	30/2 Amp Meter		EA					
	40/2 Amp Encl Ckt Brkr		EA					
	Subtotal							
27 0000	COMMUNICATIONS							
27 1500	TELEPHONE/ DATA CABLING SYSTEM							
	Telco Demarc		EA					
	3/4" Rigid Cdt		LF					
	3/4" EMT Cdt		LF					
	Tel/Data Outlet 6c		EA					
	Tel, Fax, Modem Outlet T		EA					
	Voice Alarm System:							
	Terminal Box		LS					
	Riser Junc Box 12"		EA					
	3" Rigid, Riser Cables		LF					
	3/4" Rigid Cdt		LF					
	3/4" EMT Cdt		LF					
	1" Rigid Cdt		LF					
	Shielded Pair Cable		LF					
	Voice Alarm Speaker		EA					
	Red Phone R		EA					

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**Department of
Design and
Construction**

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Intercom System:							
	Terminal Box		LS					
	Riser Junc Box 12"		EA					
	3/4" Rigid Cdt		LF					
	3/4" EMT Cdt		LF					
	1" Rigid Cdt		LF					
	Shielded Pair Cable		LF					
	Intercom		EA					
	Door Enunciator		EA					
	Power Supply		LS					
	House Bell System:							
	Terminal Box		LS					
	3/4" Rigid Cdt		LF					
	3/4" EMT Cdt		LF					
	#12 Wire		LF					
	Bell		EA					
	Door Annunciator:							
	3/4" Rigid Cdt		LF					
	#12 Wire		LF					
	Electric Strike		EA					
	Intercom Master Station		EA					
	Intercom Remote Station		EA					
	Door Release Relay		EA					
	Power Supply		EA					
	LV Transformer		EA					
	Subtotal							
27 1510	TELEVISION CABLING SYSTEM Cable TV Demarc		EA					

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Department of Design and Construction

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

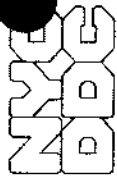
CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: F175RES2
Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Coax Cable		LF					
	CAT 6 Cable		LF					
	TV Outlet		EA					
	Subtotal							
28 0000	ELECTRONIC SAFETY AND SECURITY							
28 3100	TEMPORAL 3 CLASS A FIRE ALARM							
	Fire House Low Voltage System:							
	3/4" Emt, Cables		LF					
	Small UPS		EA					
	UPS Battery System (Install, FBO)		LS					
	1900 Signal Power Box		EA					
	Gold Box (Install, FBO)		EA					
	Flat Panel Display Monito		EA					
	PC CATS		EA					
	Install HWSP FBO		EA					
	Network Router		EA					
	Smoke Detector System w/Fan Shutdown & Elevator Recall:							
	Audible/Visual		EA					
	Audible/Visual WP		EA					
	Smoke Detector		EA					
	Heat Detector		EA					
	CO Detector		EA					
	Smoke/CO Detector		EA					
	Duct Detector		EA					
	Strobe		EA					
	Horn		EA					
	CO Strobe		EA					
	Central Equipment FACP		LS					

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Misc Connections, Modules		EA					
	FSD Connections, 120V		EA					
	Fire Alarm							
	Riser Junc Box		EA					
	1 1/2" Rigid, TV Riser Cables		LF					
	3/4" Rigid Cdt		LF					
	3/4" EMT Cdt		LF					
	Teflon Cable		LF					
	#12 Wire		LF					
	3/4" Emt, CAT 6		LF					
	FDNY Terminal Cabt		EA					
	FDNY Pullbox		EA					
	FCO Panel		EA					
	60 Amp FA Disconnect		EA					
	60 Amp FA FCO		EA					
	Pull Station		EA					
	Pull Station WP		EA					
	Data Connections		EA					
	Digital Alarm Communicator		EA					
	Subtotal							
31 0000	EARTHWORK							
31 0000	EARTHWORK							
	Clear & grub		SF					
	Grading		SF					
	Subtotal							
31 2500	EROSION AND SEDIMENTATION CONTROLS							
	Silt fence		LF					

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
31 5000	Stabilized construction entry		SF					
	Temporary stock pile silt fence		LF					
	Protect existing trees		EA					
	Subtotal							
	EXCAVATION SUPPORT AND MONITORING							
	Excavation & Fill:							
	Mass excavation		CY					
	Hauling/disposal		CY					
	Compacted granular fill		CY					
	Excavation and backfill for utility		CY					
31 6100	Compacted granular fill		CY					
	Shoring & underpinning:							
	Shoring @ exist'g West bldg.		LF					
	Shoring @ new bldg perimeter		SF					
	Shoring @ utility		SF					
	Subtotal							
	FOOTINGS							
	Driven HP soldier pile		LF					
	Equipment mobilization for piles		LS					
	HP 12 x 74 pile 24' H		EA					
32 0000 32 1400	Angles @ corner HP pile		LB					
	Plates @ pile 12 x 12 x 1		LB					
	Subtotal							
	EXTERIOR IMPROVEMENTS							
	UNIT PAVING							
	Granite paver type A w/9" reinf. Concrete base & 6" gravel		SF					

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
32 2000	Granite paver type B w/9" reinf. Concrete base & 6" gravel		SF					
	Granite paver type C w/9" reinf. Concrete base & 6" gravel		SF					
	Steel faced curb		LF					
	Granite curb @ planters		LF					
	Pigmented concrete pavement A		SF					
	Pigmented concrete pavement B		SF					
	Subtotal							
32 3119	PAVEMENT							
	Trench restoration within the rt of way		SF					
	Full depth roadway		SF					
	Mill & resurface roadway top course shown on C-100		SF					
	Access aisle ramp @ North		SF					
32 3300	Patch pavers for utility modification		LS					
	Subtotal							
	DECORATIVE METAL FENCES AND GATES							
	Metal fence @ South		SF					
	Double gate		EA					
32 3300	Subtotal							
	LANDSCAPE METAL FABRICATIONS							
	Green wall - metal panel w/ structural support		SF					
	Steel edge		LF					
	Metal planter - 6-0 x 6-0 w/bench		EA					
	Metal planter - 3-6 high		LF					
	Trellis for vines - 24"		EA					
32 3300	Trellis for vines - 36"		EA					
	Subtotal							

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

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Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

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DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
32 9113	PLANTING SOILS							
	Excavate		CY					
	Top soil		CY					
	Mulch		CY					
	Planting Area		SF					
	Subtotal							
32 9300	PLANT MATERIALS AND PLANTING							
	Trees:							
	Ginkgo		EA					
	Japanese Whitespire Clump Birch		EA					
	Sweetbay Magnolia		EA					
	Shrubs & perennials:							
	Gro Low Fragrant Sumac		EA					
	Winterberry		EA					
	Perennials & Groundcovers:							
	Lilyturf		EA					
	Lenten Rose Mix		EA					
	Pennsylvania Sedge		EA					
	Atlas Fescue		EA					
	Vines:							
	Virginia creeper		EA					
	Carolina Jessamine		EA					
	Pre grown sedum:							
	Sedum mix		SF					
	Subtotal							

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Department of Design and Construction

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
33 0000	UTILITIES							
33 0000	OTHER UTILITIES							
	Electrical Utilities:							
	Property Line Box		EA					
	Relocate street light		EA					
	Con Ed Utility Fees		LS					
	FA/ Communications:							
	4" Pvc, 4 500 Mcm UG		LF					
	Trench, Backfill, Concrete		CY					
	FA Cable		LF					
	FDNY Comm Manhole		EA					
	Type FX2		EA					
	4" gas service		LF					
	Connect 4" gas service to existing gas main		EA					
	Subtotal							
33 1000	WATER UTILITIES							
	4" Steel sch. 40 fire service		LF					
	Connect 4" fire service to existing water main		EA					
	Domestic water 4" Steel Sch 40 pipe		LF					
	Domestic water 4" UG Valve and box		EA					
	Connect 4" domestic water service to existing water main		EA					
	Irrigation		LS					
	Subtotal							
33 3000	SANITARY AND STORM SEWERAGE UTILITIES							
	36" Perforated HDPE Pipe		LF					
	Excavation & backfill		CY					
	Impervious liner		SF					

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Department of
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2

Location: 1815 Sterling Place, Brooklyn, NY 11233-5007

Bidder:

DDC ID: F175RES2

Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
	Compaction		SF					
	Gravel bedding		CY					
	Filter fabric inlet protection for yard drains		EA					
	Catch basin		EA					
	Cleanout		EA					
	Trench drain		LS					
	Excavate		CY					
	Concrete for trench drain:		CY					
	8" x 23-0		EA					
	8" x 14-0		EA					
	8" x 24-0		EA					
	8" x 8-0		EA					
	Yard drain		EA					
	Hooded storm manhole incl. excavation		EA					
	Combined sewer manhole incl. excavation:		EA					
	2" DIP		LF					
	8" DIP		LF					
	10" DIP		LF					
	12" DIP		LF					
	Fitting		EA					
	Connect 8" DIP to existing 12" combine sewer		EA					
	Subtotal							
43 0000	PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT							
43 4116	PETROLEUM BULK STORAGE TANK SYSTEMS							
	1000 Gallons above ground double wall tank		EA					
	Audible / Visible tank overflow alarm		EA					
	Audible / Visible Beacon light and alarm acknowledge switch		EA					

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

Project: New Construction of FDNY Firehouse for Rescue 2
Location: 1815 Sterling Place, Brooklyn, NY 11233-5007
Bidder:

DDC ID: F175RES2
Sponsor Agency: FDNY

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Materials and Labor
43 4117	6" Emergency Vent		EA					
	10 Gals integral overflow with hinge		EA					
	Hydrostatic test		EA					
	Gauge, fittings and accessories		LOT					
	Flex connection		EA					
	Diesel Fuel		GALS					
	4" Fill port		EA					
	Fuel Dispenser, Gasboy 9100 (or equal)		EA					
	Fuel Management and Monitoring system TLS - 450		EA					
	Suction with nozzle, hose, swivel, breakaway and high hose retriever		EA					
	Subtotal							
43 4117	PETROLEUM BULK STORAGE PRODUCT PIPING							
	2" Fuel and vent pipe and fittings		LF					
	6" Fuel pipe and fittings, Vent		LF					
	Subtotal							
43 4118	PETROLEUM BULK STORAGE INSTRUMENTATION AND CONTROL (included w/ section 434116)							
	TOTAL CONTRACT 1 - GENERAL CONSTRUCTION WORK							

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ATTACHMENT 1 - BID INFORMATION
PROJECT ID: F175RES2

DESCRIPTION AND LOCATION OF WORK:

New Construction of FDNY Firehouse for Rescue 2
1815 Sterling Place
Brooklyn, NY 11233
E-PIN: 85016B0048 / DDC PIN: 8502016FI0002C

DOCUMENTS AVAILABLE AT:

Department of Design and Construction, Contract Section
 30-30 Thomson Avenue – 1st Floor, Long Island City, NY 11101

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

On or Before: **WEDNESDAY, JANUARY 06, 2016**
BIDS MUST BE CLOCKED IN PRIOR TO BID OPENING

PLACE TO SUBMIT:

Department of Design and Construction, Contract Section
 30-30 Thomson Avenue – 1st Floor, Long Island City, NY 11101

BID OPENING:

PLACE OF BID OPENING:	Department of Design and Construction Contract Section - First Floor 30-30 Thomson Avenue Long Island City, NY 11101
DATE AND HOUR:	WEDNESDAY, JANUARY 06, 2016 AT 2:00 P.M.
	LATE BIDS WILL NOT BE ACCEPTED

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 the amount of \$1,000,000.00 or more. 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) 391-1016 or (718) 391-2601 Fax: (718) 391-2615

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**BID BOOKLET
PART B**

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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 _____ YES _____ NO

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:

- _____ YES _____ NO Contractor has received a willful violation issued by OSHA or New York City Department of Buildings (NYCDOB) within the last three years.
- _____ YES _____ NO Contractor has had an incident requiring OSHA notification within 8 hours (all work-related fatalities) or an incident requiring OSHA notification within 24 hours (all work-related inpatient hospitalizations, all amputations and all losses of an eye).

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)

☐ YES ☐ NO Contractor previously audited by the DDC Office of Site Safety.

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

☐ YES ☐ NO Accident on previous DDC Project(s).

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

☐ YES ☐ NO 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].

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

Date: _____

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

Title: _____

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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

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**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.

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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: _____

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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

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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:

<input type="checkbox"/> Minority Owned Business Enterprise	<input type="checkbox"/> Locally Based Business Enterprise
<input type="checkbox"/> Women Owned Business Enterprise	<input type="checkbox"/> Emerging Business Enterprise
<input type="checkbox"/> Disadvantaged Business Enterprise	
- 2a. If you are certified as an **MBE, WBE, LBE, EBE** or **DBE**, 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 ____
5. Are you a Union contractor? Yes ____ No ____ If yes, please list which local(s) you affiliated with _____
6. Are you a Veteran owned company? Yes ____ No ____

PART I: CONTRACTOR/SUBCONTRACTOR INFORMATION

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

13. Number of employees in your company: _____

14. Contract information:

(a) _____
Contracting Agency (City Agency)

(b) _____
Contract Amount

(c) _____
Procurement Identification Number (PIN)

(d) _____
Contract Registration Number (CT#)

(e) _____
Projected Commencement Date

(f) _____
Projected Completion Date

(g) Description and location of proposed contract:

15. 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.

16. 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.

17. 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: _____

18. 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.

19. 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

20. 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?

21. 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___ |

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

23. 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.

24. 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.

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

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

26. 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.

27. 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.

28. 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.

29. 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).

30. 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).

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

FORM A. CONTRACT BID INFORMATION: USE OF SUBCONTRACTORS/TRADES

1. Do you plan to subcontract work on this contract? Yes ☐ No ☐
2. If yes, complete the chart below.

NOTE: All proposed subcontractors with a subcontract in excess of \$750,000 must complete an Employment Report for review and approval before the contract may be awarded and work commences.

SUBCONTRACTOR'S NAME*	OWNERSHIP (ENTER APPROPRIATE CODE LETTERS BELOW)	WORK TO BE PERFORMED BY SUBCONTRACTOR	TRADE PROJECTED FOR USE BY SUBCONTRACTOR	PROJECTED DOLLAR VALUE OF SUBCONTRACT

***If subcontractor is presently unknown, please enter the trade (craft name).**

OWNERSHIP CODES

- W: White
- B: Black
- H: Hispanic
- A: Asian
- N: Native American
- F: Female

FORM B: PROJECTED WORKFORCE

TRADE CLASSIFICATION CODES

(J) Journeylevel Workers
(H) Helper
(TOT) Total by Column

(A) Apprentice
(TRN) Trainee

For each trade to be engaged by your company for this project, enter the projected workforce for Males and Females by trade classification on the charts below.

Trade:

MALES

FEMALES

Union Affiliation, if applicable

Total (Col. #1-10):

Total Minority, Male & Female
(Col. #2,3,4,5,7,8,9, & 10):

Total Female
(Col. #6 - 10):

	(1) White Non Hisp.	(2) Black Non Hisp.	(3) Hisp.	(4) Asian	(5) Native Amer.
J					
H					
A					
TRN					
TOT					

	(6) White Non Hisp.	(7) Black Non Hisp.	(8) Hisp.	(9) Asian	(10) Native Amer.
J					
H					
A					
TRN					
TOT					

What are the recruitment sources for you projected hires (i.e., unions, government employment office, job tap center, community outreach)?

FORM B: PROJECTED WORKFORCE

Trade:

Union Affiliation, if applicable

Total (Col. #1-10):

Total Minority, Male & Female
(Col. #2,3,4,5,7,8,9, & 10):

Total Female
(Col. #6 - 10):

MALES

(1) White Non Hisp.	(2) Black Non Hisp.	(3) Hisp.	(4) Asian	(5) Native Amer.

J

H

A

TRN

TOT

FEMALES

(6) White Non Hisp.	(7) Black Non Hisp.	(8) Hisp.	(9) Asian	(10) Native Amer.

What are the recruitment sources for you projected hires (i.e., unions, government employment office, job tap center, community outreach)?

FORM C: CURRENT WORKFORCE

TRADE CLASSIFICATION CODES

(J) Journeylevel Workers
(H) Helper
(TOT) Total by Column

(A) Apprentice
(TRN) Trainee

For each trade currently engaged by your company for all work performed in New York City, enter the current workforce for Males and Females by trade classification on the charts below.

Trade:

MALES

FEMALES

Union Affiliation, if applicable

Total (Col. #1-10):

Total Minority, Male & Female
(Col. #2,3,4,5,7,8,9, & 10):

Total Female
(Col. #6 - 10):

	(1)		(2)		(3)		(4)		(5)	
	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.
J										
H										
A										
TRN										
TOT										

	(6)		(7)		(8)		(9)		(10)	
	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.	White Hisp.	Black Non Hisp.
J										
H										
A										
TRN										
TOT										

What are the recruitment sources for you projected hires (i.e., unions, government employment office, job tap center, community outreach)?

FORM C: CURRENT WORKFORCE

Trade:

Union Affiliation, if applicable

Total (Col. #1-10):

Total Minority, Male & Female
(Col. #2,3,4,5,7,8,9, & 10):

Total Female
(Col. #6 - 10):

MALES

(1) White Non Hisp.	(2) Black Non Hisp.	(3) Hisp.	(4) Asian	(5) Native Amer.
J				
H				
A				
TRN				
TOT				

FEMALES

(6) White Non Hisp.	(7) Black Non Hisp.	(8) Hisp.	(9) Asian	(10) Native Amer.

What are the recruitment sources for you projected hires (i.e., unions, government employment office, job tap center, community outreach)?

FMS ID: F175RES2



Department of
Design and
Construction

**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

New Construction of FDNY Firehouse for Rescue 2

LOCATION: 1815 Sterling Place
BOROUGH: Brooklyn, 11233
CITY OF NEW YORK

Contractor

Dated _____, 20____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____, 20____





Department of
Design and
Construction

PROJECT ID:

F175RES2

**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

**New Construction of FDNY Firehouse
for Rescue 2**

LOCATION:
BOROUGH:
CITY OF NEW YORK

1815 Sterling Place
Brooklyn, 11233

CONTRACT NO. 1

GENERAL CONSTRUCTION WORK

FDNY

Studio Gang Architects

Date:

October 16, 2015



16-042



Department of
Design and
Construction

**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



10/10/10

10/10/10

10/10/10

2015 “New Construction” Project Labor Agreement

NOTICE: THIS CONTRACT IS SUBJECT TO A NEW PROJECT LABOR AGREEMENT EXECUTED IN 2015

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 individual PLAs, while similar, are not identical. All bidders should carefully read the entire PLA that governs this Contract.

In addition, please note that there are significant differences between the 2015 PLA attached to this bid and the Citywide Renovation PLA as well as previous new construction PLAs. The Contractor is urged to review the entire PLA. Significant changes include:

- **Grievances:** The grievance procedure governing disputes under the PLA has been clarified. See PLA Article 9, Section 1.
- **Delinquent Contractors:** Contractors and Subcontractors who do not make required payments to union funds on a timely basis are subject to requirements to submit cancelled checks or another form of proof of payment in addition to certified payroll reports when requesting payment. See PLA Article 11, Section 2.
- **Payment to Union Funds for Non-Union Workers:** Non-union Contractors with bona fide private benefit plans that satisfy the requirements of Labor Law 220 will not be required to pay into union benefit funds for "core" non-union employees (working pursuant to Article 4, Section 2 of the PLA) who are already covered under such bona fide private benefit plans. See PLA Article 11, Section 2.
- **Veterans Day:** Veterans Day has been added to the list of standard holidays. See Article 12, Section 4.
- **Reporting Pay for Weather Events:** The usual reporting pay requirement of two hours for employees who report to their work location pursuant to their regular schedule does not apply when the National Weather Service issues a Weather Advisory and the Contractor speaks to the employee at least four hours before his/her shift starting time. See Article 12, Section 6.

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. 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 implemented pursuant to New York City Administrative Code §6-129, 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 certified M/WBE firms may be obtained from the Department of Small Business Services (DSBS) website at www.nyc.gov/getcertified, by emailing DSBS at MWBE@sbs.nyc.gov, by calling the DSBS certification hotline at (212) 513-6311, or by visiting or writing DSBS at 110 William St., 7th floor, New York, New York, 10038.

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:

1. **Q.** 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.
2. Q. Does a Contractor agreeing to the PLA and signing the Letter of Assent create a labor agreement with these unions outside of the project covered by the PLA?
- A. No, the PLA applies only to those projects that the Contractor agrees to perform under the PLA and makes no labor agreement beyond those projects.
3. Q. Do the provisions of the PLA apply equally to subcontractors as well as contractors and how does the PLA affect the subcontractors that a bidder may utilize on the project?
- A. Yes, the PLA applies to subcontractors and all subcontractors must agree to become party to the PLA. See PLA Art. 2, Sec. 8. 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.
4. Q. Are bidders required to submit Letters of Assent signed by proposed subcontractors with their bid in order to be found responsive?
- A. No, bidders do not have to submit signed Letters of Assent from their subcontractors with their bid. Subcontractors, however, will be required to sign the Letter of Assent prior to being approved by the Department.
5. Q. May a Contractor or subcontractor use any of its existing employees to perform this work?
- A. Generally labor will be referred to the Contractor from the respective signatory local unions. 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.
6. Q. Must the City set M/WBE participation goals for the particular project or contract in order for a certified M/WBE to utilize the provisions of PLA Article 4, Section 2C?
- A. No. PLA Article 4, Section 2(C) specifies what categories of M/WBEs are eligible to take advantage of this provision (i.e., those M/WBEs for which the City is authorized to set participation goals under §6-129). For purposes of section 2(C), it is not necessary for the project to be subject to §6-129 or for the City to have actually set participation goals for the particular contract or project. The result is the same where a project receives State funding and therefore is subject to the requirements of Article 15-A of the Executive Law.
7. Q. May a Contractor bring in union members from locals that are not signatory unions?
- A. Referrals will be from the respective signatory locals and/or locals listed in Schedule A of the PLA. Contractors may utilize 'traveler provisions' contained in the

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

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

A. No, the non-union employee does not automatically become a union member by working on a project covered by the PLA. 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 except in certain circumstances as set forth in the PLA. See PLA Article 4, Section 6 and Article 11.

9. **Q.** When will the agency shop dues payer affiliate workers become eligible for union benefits?

A. Union benefit plans have their own plan documents that determine eligibility and workers will become eligible for certain benefits at different points in time. Contractors who will have agency shop dues payer affiliate workers should speak with the respective union(s) as to benefit eligibility thresholds.

10. **Q.** 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. Except in certain circumstances, as described in the following paragraph, Contractors and subcontractors working under the PLA will be required to contribute on behalf of all employees covered by the PLA to established jointly 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 to 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 D.

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

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

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

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

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

12. Q. 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.

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

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

14. Q. May a contractor discharge a union referral for lack of productivity?

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

15. Q. May a contractor assign a management person to site?

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

16. Q. 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.

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

A. Yes, the PLA recognizes nine (9) common holidays, including Veterans Day. See PLA Article 12, Section 4.

18. **Q.** May the Contractor schedule overtime work, including work on a weekend?
- A.** Yes, the PLA permits the Contractor to schedule overtime work, including work on weekends. See PLA Article 12, Sections 2, 3, and 5. To the extent that the Agency's approval is required before a Contractor may schedule or be paid for overtime, that approval is still required notwithstanding the PLA language.
19. **Q.** Are overtime payments affected by the PLA?
- A.** Yes, all overtime pay incurred Monday through Saturday will be at time and one half (1 ½). There will be no stacking or pyramiding of overtime pay under any circumstances. See PLA Article 12, Section 2. Sunday and holiday overtime will be paid according to each trade's CBA.
20. **Q.** Are there special provisions for Saturday work when a day is 'lost' during the week due to weather, power failure or other emergency?
- A.** Yes, when this occurs the Contractor may schedule Saturday work at weekday rates. See PLA Article 12, Section 5.
21. **Q.** 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.
22. **Q.** What do the workers get paid when work is terminated early in a day due to inclement weather or otherwise cut short of 8 hours?
- A.** The PLA provides that employees who report to work pursuant to regular schedule and not given work will be paid two hours of straight time. Work terminated early for severe weather or emergency conditions will be paid only for time actually worked. In other instances where work is terminated early, the worker will be paid for a full day. See PLA Article 12, Sections 6 and 8. The usual reporting pay requirement of two hours for employees who report to their work location pursuant to their regular schedule does not apply when the National Weather Service issues a Weather Advisory and the Contractor speaks to the employee at least four hours before their shift starting time. See PLA Article 12, Section 6.
23. **Q.** If a local collective bargaining agreement of a signatory union expires 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.

24. **Q.** May a Contractor working under the PLA be subject to a strike or other boycott activity by a signatory union at another site while the Contractor is a signatory to the PLA?
- A.** Yes. The PLA applies ONLY to work under the PLA and does not regulate labor relations at other sites even if those sites are in close proximity to PLA work.
25. **Q.** If a Contractor has worked under other PLAs in the New York City area, are the provisions in this PLA generally the same as the others?
- A.** While 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.
26. **Q.** What happens if a dispute occurs between the Contractor and an employee during the project?
- A.** The PLA contains a grievance and arbitration process to resolve disputes between the Contractor and the employees. See PLA Article 9.
27. **Q.** What happens if there is a dispute between locals as to which local gets to provide employees for a particular project or a particular aspect of a project?
- A.** The PLA provides for jurisdictional disputes to be resolved in accordance with the NY Plan. 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.

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA

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

2015 - 2018

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**PROJECT LABOR AGREEMENT COVERING IDENTIFIED
NEW CONSTRUCTION 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 new construction ("Program Work," as defined in Article 3) in a manner designed to afford the lowest costs to the Agencies covered by this Agreement, and the Public it represents, and the advancement of permissible statutory objectives;

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

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

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

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

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

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

- (6) permitting adjustments to work rules and staffing requirements from those which otherwise might obtain;
- (7) providing comprehensive and standardized mechanisms for the settlement of work disputes, including those relating to jurisdiction;
- (8) 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, acting through the Department of Design and Construction, 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 contractors, and subcontractors of all tiers engaged in Program Work within the scope of this Agreement as defined in Article 3; "Agency" means means the New York City Department of Design and Construction (DDC) or such other City agency that executes an addendum pursuant to Article 3, Section 1 of this Agreement; 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 ["BCTC" or "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 Commissioner of the Department of Design and Construction 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 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 will be performed under the terms and conditions set out in the Schedule A agreements of Operating Engineers Locals 14 and 15. The Collective Bargaining Agreements of the affiliated local unions that cover the particular type of construction work to be performed by the contractor, and as set forth in the Schedule A list of Agreements, shall be deemed the Schedule A Collective Bargaining Agreements ("Schedule A CBA") under this Agreement. Where association and independent

Collective Bargaining Agreements for a particular type of construction work are both set forth in Schedule A, association members shall treat the applicable association agreement as the Schedule A CBA and independent contractors shall treat the applicable independent agreement as the Schedule A CBA. Subject to the foregoing, where a subject covered by the provisions of this Agreement is also covered by a Schedule A Collective Bargaining Agreement, 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

Program Work shall be limited to construction contracts bid and let by the Agency (or its Construction Manager where applicable) after the effective date of this Agreement (and prior to December 31, 2018) for that new construction on any Project for which an

addendum has been issued pursuant to the provisions set forth below. Additional Projects may be added to this Agreement through a Project specific Addendum approved by an agency of the City of New York and by the BCTC on behalf of itself and its affiliated Local Unions. Each Project specific addendum is to outline and include a description of the project being undertaken, the project's location, and the general findings of the Feasibility Analysis used as the basis of the determination to utilize a PLA on the project.

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

1. Contracts let and work performed under contracts bid prior to the effective date of this Agreement and all contracts let after December 31, 2018;
2. Contracts procured on an emergency basis;
3. Contracts that do not exceed \$250,000;
4. 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;
5. Contracts for installation of information technology that are not otherwise Program Work; and
6. Contracts that do not exceed \$1 Million that are awarded pursuant to

prequalified lists (PQLs) established by City agencies where entry on to the PQL is restricted to MWBEs, or a combination of MWBEs together with joint ventures which include at least one MWBE, or contractors who agree to subcontract at least 50% of the contract to MWBEs.

SECTION 2. TIME LIMITATIONS

In addition to falling within the scope of Article 3, Section 1, to be covered by this Agreement Program Work must be (1) advertised and let for bid after the effective date of this Agreement, and (2) let for bid prior to December 31, 2018, 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 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;

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA

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

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.

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

C. Notwithstanding Section 2(B), above, certified MWBE contractors for which participation goals are set forth in New York City Administrative Code §6-129, 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 shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements and shall be subject to such other conditions as are established in this Article. No employment applicant shall be discriminated against by any referral system or hiring hall because of the applicant's union membership, or lack thereof.

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

In the event a Local Union either fails, or is unable to refer qualified 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.

In the event that the City or a City agency determines to adopt local workforce participation goals to be set forth in an Agency's (or, if applicable Construction Manager's) bid specifications, the City and BCTC will work together to seek agreement on appropriate goals to be set forth in applicable bid documents and to be subject to the provisions of this section.

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

SECTION 5. CROSS AND QUALIFIED REFERRALS

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

SECTION 6. 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.

SECTION 8. ON CALL REPAIR REFERRALS

A. When an Agency awards a contract that requires the Contractor to have employees available on short notice to make time sensitive repairs with such contract requiring the Contractor to respond within as little as two hours from the time the Contractor is contacted by the Agency ("On Call, Repair Contract"), the Contractor will, within ten (10) days of being awarded an On Call Repair Contract subject to this agreement, notify the appropriate affiliated Union that it has been awarded such a contract

and immediately enter into good faith negotiations with such relevant affiliated Union to establish a procedure to receive time sensitive referrals from such affiliated Union(s).

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

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

2. The relevant affiliated Unions shall prepare a list of individuals eligible and prepared for referral on an immediate basis to respond to the on call repair contractor. Such list shall be provided to and in the possession of the designated on call repair contact person for the affiliated Union and available for immediate reference.

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

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

C. In the event that the Contractor makes a request for an on call referral that is compliant with this procedure and a Union is not able to respond to the

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

ARTICLE 5- UNION REPRESENTATION

SECTION 1. LOCAL UNION REPRESENTATIVE

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

SECTION 2. STEWARDS

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

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

C. The Stewards shall not have the right to determine when overtime shall be worked, or who shall work overtime except pursuant to a Schedule A 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 Contractor's choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials or products, tools, or other labor-saving devices. Contractors may, without restriction, install or use materials, supplies or equipment regardless of their source; provided, however, that where there is a Schedule "A" 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

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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, 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. Grievances shall include the City contract number and the Program Work address; such information is posted at the Program

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Work Site if already commenced, and is available in the City Record and Notice to Proceed for projects not already commenced.

Grievances as to whether a scope of work is included or excluded from this Agreement shall be submitted to the Labor Management Committee (LMC) in the first instance rather than Step 1 below. To be timely, such notice must be given no later than ten days prior to a bid opening if the grievance is challenging a determination by an Agency that the contract is not subject to this Agreement. For other grievances as to contractor scope of work issues, notice of such challenges shall be submitted to the LMC within 7 calendar days after the act, occurrence or event giving rise to the grievance. If the scope of work grievance is not resolved within 21 days of its submission to the LMC, then the grievance may proceed directly to Step 3 below.

Step 1:

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

claimed violation, the date on which the grievance occurred, and the provisions of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 are non-precedential except as to the specific Local Union, employee and Contractor directly involved unless the settlement is accepted in writing by the 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:

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

Step 3:

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

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

(b) Failure of the grieving party to adhere to the time limits set forth in this Article shall render the grievance null and void. These time limits may be extended only by written consent of the 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, with the exception of those related to compliance with requirements to pay prevailing wages and supplements in accordance with federal or State law, may provide retroactivity of any kind exceeding 60 calendar days

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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 the applicable Collective Bargaining Agreements 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

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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. 1. Notwithstanding Section 2 (A) above, and subject to 2 (B)(2) below, Contractors who designate employees pursuant to Article 4, Section 2 (B) and (C) ("core" employees) that are not signatory to a Schedule A Agreement and who maintain bona fide private benefit plans that satisfy the requirements of Section 220 of the Labor Law, may satisfy the above benefit obligation with respect to those employees by providing those employees with coverage under their private benefit plans (to the extent consistent with Section 220). The total benefit payments to be made on behalf of each such employee must be equal to the total Section 220 supplement amount and any shortfall must be paid by cash supplement to the employee.

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

3. The City shall verify that the alternate benefit plan(s), together with any cash supplement to the employee, is compliant with Section 220 prior to awarding the Contractor a contract covered by this Agreement. In the event the Contractor's alternate benefit plan(s), together with any cash supplement to the employee, is determined to be

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

C. 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.

D. 1. To the extent consistent with New York City's Procurement Policy Board Rules with respect to prompt payment, as published at www.nyc.gov/ppb, §4-06(e), and in consideration of the unions' waiver of their rights to withhold labor from a contractor or subcontractor delinquent in the payment of fringe benefits contributions ("Delinquent Contractor"); the Agency agrees that where any such union and/or fringe benefit fund shall notify the Agency, the General Contractor, and the Delinquent Contractor in writing with back-up documentation that the Delinquent Contractor has

failed to make fringe benefit contributions to it as provided herein and the Delinquent Contractor shall fail, within ten (10) calendar days after receipt of such notice, to furnish either proof of such payment or notice that the amount claimed by the union and/or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor which the union or fringe benefit fund claims to be due it, and shall remit the amount when and so withheld to the fringe benefit fund and deduct such payment from the amounts then otherwise due and payable to the General Contractor, which payment shall, as between the General Contractor and the Agency, be deemed a payment by the Agency to the General Contractor; provided however, that in any month, such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. The union or its employee benefit funds shall include in its notification of delinquent payment of fringe benefits only such amount it asserts the Delinquent Contractor failed to pay on the specific project against which the claim is made and the union or its employee benefit funds may not include in such notification any amount such Delinquent Contractor may have failed to pay on any other City or non-City project.

2. In addition, where a union or employee benefit fund gives notice to the City that a Contractor is Delinquent as defined in subsection 2(D)(1) above and the City determines that the notice includes appropriate back-up documentation that the Contractor is delinquent, the City will promptly, but not later than twenty (20) days after receipt of the

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

The City and the relevant Agency(s) will thereafter require the Delinquent Contractor to provide cancelled checks or other equivalent proof of payment of benefit contributions that have come due, to be submitted with certified payroll reports for all Program Work covered by this Agreement on which the Delinquent Contractor is engaged, for at least a one-year period or such earlier period if the Contractor is ultimately determined not be a Delinquent Contractor. Such proof of payment when required is a condition of payment of the Delinquent Contractor's invoices by any entity, including, but not limited to, the City, the relevant Agency(s), Construction Manager, General Contractor, the prime or higher level subcontractor, as is appropriate under the Delinquent Contractor's engagement. The union and the funds shall upon request receive copies of the certified payrolls, cancelled checks, or other proof of payment from the City and/or the relevant Agency(s).

E. In the event the General Contractor or Delinquent Contractor shall notify the Agency as above provided that the claim of the union or fringe benefit fund is in

dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor that the union and/or employee benefit fund claims to be due it, pending resolution of the dispute pursuant to the union's Schedule A agreement, and the amount shall be paid to the party or parties ultimately determined to be entitled thereto, or held until the Delinquent Contractor and union or 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.

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

shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed, between the union/fund and/or fringe benefit and the Agency.

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

SECTION 1. WORK WEEK AND 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. The Evening Shift shall commence between the hours of 3:00 p.m. and 6:00 p.m., unless different times are necessitated by the Agency's phasing plans on specific projects. The Night Shift shall commence between the hours of 11:00 p.m. and 2:00 a.m., unless different times are necessitated by the Agency's phasing plans on specific projects. Subject to the foregoing, starting and quitting times shall occur at the Program Work site designated by the Contractor.

C. Scheduling — Except as provided above, Monday through Friday is the standard work week; 8 hours of work plus ½ hour unpaid lunch.

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 and work 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.

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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. 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 nine (9) recognized holidays on the Project:

New Year's Day

Martin Luther King Day

Memorial Day

Labor Day

Independence Day

President's Day

Veteran's Day

Thanksgiving 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 WORK

The Contractor may schedule a Saturday work day and such time shall be scheduled and paid at time and one-half (1½) unless the applicable Schedule A permits a straight time rate.

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. Contractors shall not be permitted to call, text or email or voicemail employees in advance of their regularly scheduled shift starting time to avoid reporting pay. Notwithstanding the above, in the event that the National Weather Service issues a weather advisory for the area in which the work location is situated, and the entire project is shut down as a result of the Weather Advisory, the contractor shall be permitted to speak to employees no less than four (4) hours in advance of their shift starting time, unless the Local Union consents to a shorter notice in writing, to advise them not to report to work due to the National Weather Service advisory, and employees who are so notified shall not receive two (2) hours

reporting pay if they report to the work location. The contractor shall make every effort to notify each employee directly and confirm that notification has been received. Voice, text, and email messages left for employees without confirmation of delivery and receipt by employee do not constitute sufficient notice under this provision.

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

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

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

E. There shall be no pay for time not actually worked except as specifically set forth in this Article and except where an applicable Schedule A 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

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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.

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

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

ARTICLE 16 - NO DISCRIMINATION

SECTION 1. COOPERATIVE EFFORTS

The Contractors and Unions agree that they will not discriminate against any employee or applicant for employment because of creed, race, color, religion, sex,

sexual orientation, national origin, marital status, citizenship status, disability, 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 that are the basis for the Schedule A notify the Agency and Construction Manager in writing of the 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.

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 New York City 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 Program to create and maintain an integrated database of veterans interested in working on this Project and of

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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.

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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
Gary LaBarbera
President

FOR NEW YORK CITY

BY: _____
Dr. Feniosky Peña-Mora
Commissioner, Department of Design & Construction

APPROVED AS TO FORM:

ACTING CORPORATION COUNSEL
NEW YORK CITY

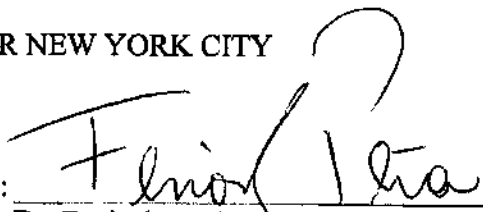
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IN WITNESS WHEREOF the parties have caused this Agreement to be executed and
effective as of the ____ day of _____, _____

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

BY: _____
Gary LaBarbera
President

FOR NEW YORK CITY

BY: 
Dr. Feniosky Peña-Mora
Commissioner, Department of Design & Construction

APPROVED AS TO FORM:



ACTING CORPORATION COUNSEL
NEW YORK CITY

(TM)

SEP 23 2015

LIST OF SIGNATORY UNIONS
Boiler Makers Local No. 5
Carpenters District Council
Cement Masons No. 780
Concrete Workers, District Council No. 16
Derrickmen and Riggers, Local Union No. 197
Drywall Tapers 1974, District Council 9
Electrical Workers Local No. 3
Glaziers Local Union No. 1087 District Council 9
Heat & Frost Insulators, Local Union No. 12A
Heat & Frost Insulators, Local Union No. 12
Iron Workers District Council
Iron Workers Local Union No. 40
Iron Workers Local No. 361
Laborers Local No. 78, Asbestos & Lead Abatement
Laborers Local 1010 Pavers and Road Builders District Council
Laborers 79 Construction and General Building Laborers
Laborers Local No. 731 Excavators
Mason Tenders District Council
Metal Lathers Local No. 46
Metal Polishers District Council 9
Ornamental Iron Workers Local No. 580
Painters District Council 9
Plumbers Local No. 1
Painters, Decorators & Wallcoverers District Council 9
Painters Structural Steel No. 806
Plasterers Local Union No. 262
Roofers & Waterproofers Local 8
Steamfitters Local Union No. 638
Sheet Metal Workers Local No. 28
Sheet Metal Workers Local No. 137
Teamsters Local Union No. 282
Teamsters Local Union 814
Teamsters Local No. 813 Private Sanitation
Tile, Marble & Terrazzo B.A.C. Local Union No. 7

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SCHEDULE "A"

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

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International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Environmental Contractors Association, Inc.
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No. 5	Boilermakers Association of Greater New York
Local Union No. 3 International Brotherhood of Electrical Workers, AFL-CIO	New York Electrical Contractors Association
International Brotherhood of Teamsters, Local 282, High Rise contract	Building Contractors Association & Independents
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Cement League
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Independent
Local 8 Roofers, Waterproofers & Allied Workers	Roofing and Waterproofing Contractors Association of New York and Vicinity
Local Union 1 of the United Association of Journeymen and Apprentices of the Pipe Fitting Industry of the United States and Canada	Association of Contracting Plumbers of the City of New York
Local Union Number 40 & 361 of Bridge, Structural Ornamental and Reinforcing Iron Workers AFL-CIO	Independent
Operative Plasterers' and Cement Masons' International Association Local No. 262	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	Independent

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Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	The Association of Master Painters & Decorators of NY, Inc. and The Association of Wall, Ceiling & Carpentry Industries of NY, Inc. and The Window and Plate Glass Dealers Association
Sheet Metal Workers' International Association, Local 28	Sheet Metal & Air Conditioning Contractors Association of New York City, Inc.
Sheet Metal Workers' International Association, Local 137	The Greater New York Sign Association
Structural Steel and Bridge Painters Local 806, DC 9 International Union of Painters and Allied Trades, AFL-CIO	New York Structural Steel Painting Contractors Association
Teamsters Local 813	Independent
Teamsters Local 813	IESI NY Corporation
Teamsters Local 814	Greater New York Movers and Warehousemen's Bargaining Group
The Cement Masons' Union, Local 780	Cement League
The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Cement League
The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Independent

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The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local No. 1556	Concrete Contractors of NY
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Millwright Local 740	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Manufacturing Woodworkers Association of Greater New York Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Hoisting Trade Association of New York, Inc.
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Test Boring Association

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA

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

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA

United Derrickmen & Riggers Association, Local 197 of NY, LI, Westchester & Vicinity	Contracting Stonesetters Association Inc.
United Derrickmen & Riggers Association L 197 of NY, LI, Westchester and Vicinity	Building Stone and Pre-cast Contractors Association
International Union of Operating Engineers Local 14-14B	Building Contractors Association
International Union of Operating Engineers Local 14-14B	Contractors Association of Greater NY
International Union of Operating Engineers Local 14-14B	GCA
International Union of Operating Engineers Local 14-14B	The Cement League
International Union of Operating Engineers Local 14-14B	Allied Building Metal Industries, Inc.
International Union of Operating Engineers Local 14-14B	Brick Association
International Union of Operating Engineers Local 14-14B	Independent
International Union of Operating Engineers Local 15	Allied Building Metal Industries, Inc.
International Union of Operating Engineers Local 15-15A	General Contractors Association
International Union of Operating Engineers Local 15D	General Contractors Association
International Union of Operating Engineers Local 15D	Structural Steel Erectors

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA

International Union of Operating Engineers Local 15-15A	Building Contractors Association
International Union of Operating Engineers Local 15D	Building Contractors Association
International Union of Operating Engineers Local 15-15A	Contractors Association of Greater NY
International Union of Operating Engineers Local 15D	Contractors Association of Greater NY
International Union of Operating Engineers Local 15-15A	The Cement League
International Union of Operating Engineers Local 15D	The Cement League

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; local trust agreements for employee benefit funds; and trust documents for joint apprentice programs as well as apprentice program rules and procedures but only to the extent of Program Work and as required by the PLA.
- (3) Authorizes the parties to such local trust agreements to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor but only to the extent of Program Work as required by the PLA.
- (4) Certifies that it has no commitments or agreements that would preclude its full and complete compliance with the terms and conditions of said Agreement. The Contractor agrees to employ labor that can work in harmony with all other labor on the Project and shall require labor harmony from every lower tier subcontractor it has engaged or may engage to work on the Project. Labor harmony disputes/issues shall be subject to the Labor Management Committee provisions.
- (5) Agrees to secure from any Contractor(s) (as defined in said Agreement) which is or becomes a Subcontractor (of any tier), to it, a duly executed Agreement to be Bound in from identical to this document.

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

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA

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 _____,

Notary Public

NEW YORK CITY BUILDING AND CONSTRUCTION TRADES COUNCIL STANDARDS OF EXCELLENCE

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

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

- *Provide a full 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.

NYC AGENCY NEW CONSTRUCTION CITY OWNED BUILDINGS/STRUCTURES PLA



BUILDSAFENYC

Codes of Conduct

BuildSafeNYC establishes that all BTEA member companies and BCTC member unions establish minimum safety standards on all building construction projects in NYC as follows:

- The workforce shall adhere to the minimum personal protective equipment (PPE) usage to include:
 - ANSI compliant Hard Hats (with ratchet suspension) at all times (supplied by employer)
 - Construction-type Work Boots at all times
 - Long Pants and shirts with at least short sleeves at all times (no shorts or tank tops)
 - ANSI compliant Eye Protection in their possession and used as needed (supplied by employer)
 - Adequate Hearing Protection in their possession and used as needed (supplied by employer)
 - High-Vis traffic vests at street level and when around heavy equipment (supplied by employer)
- CM and Subcontractor management shall implement a fair and consistent disciplinary policy for all site personnel regarding the adherence to site safety rules and requirements. Likewise, a joint labor / management team will periodically assess project wide implementation of these Codes.
- CM firms shall maintain minimum standards for workforce restroom, hygiene facilities and housekeeping, Initially and throughout the duration of the project.
- All personnel shall adhere to a strict policy against drug and alcohol possession and use on sites and during hours of work.
- All personnel shall attend a site safety orientation prior to beginning work. Worker certifications of safety training for specific tasks such as fire watch, flagmen, and safety attendant must be verified.
- No cell phones, portable media devices, radios or other devices that limit hearing and attention shall be used while working on sites.
- Ground Fault Circuit Interrupters (GFCI) will be used on all power tools and extension cords.
- Union trade representatives shall participate in a regularly scheduled site safety meeting on all projects regardless of size.
- Extreme effort shall be made to isolate the public from all construction activity. Specifically, systems shall be put in place to control falling materials and pedestrian exposure. This should be a top priority for the entire project workforce.
- Workers shall honor security access control systems to establish entry to sites by authorized personnel only, where applicable.
- Fall protection management shall be a top project priority. Workers shall maintain and use necessary fall protection systems and procedures where appropriate. Engineering controls and work methods which eliminate, guard, or otherwise control fall hazards shall take priority over personal fall arrest system usage.
- Where hazardous materials are present, projects shall implement efforts to communicate and control potential exposure to the workforce.

With Full Support and Endorsement of:

Joseph Colitti
 Louis J. Colitti, President & CEO
 Building Trades Employees Association
BTEANYC
 Building Trades Employees Association

Edward J. Maffey
 Edward J. Maffey, President
 Building and Construction Trades Council



<u>James Abadio</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>Tommy Maffey</u> General Superintendent		<u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent		Construction Management Firm <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent		Trade Unions <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent	
<u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent		<u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent		<u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent		<u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent <u>John J. Maffey</u> General Superintendent	

NOTICE TO BIDDERS

Please be advised that the City of New York has issued a new Standard Construction Contract. The new Contract, which is incorporated in this bid, is significantly different from the 2008 version previously used by the City. A listing of some of the significant changes is provided below. This notice is only a partial listing. Please refer to the Contract itself for a full understanding of the changes and the actual text of the changes that were made. 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.

Significant changes include the following:

ARTICLE 11 DAMAGES CAUSED BY DELAYS

In 2008, the City embarked on a pilot project to test the use of new construction contract language altering the allocation of the risk of project delays, as between the City and the contractor. The City has determined to make the pilot project language the standard language for all City construction contracts. Accordingly, there is now one Standard City Construction Contract that it to be used by all agencies for all bids released after the release of the new contract. The damages for delay language is Article 11. Please note that changes have been made to the damages for delay provisions from the pilot to the adopted version.

ARTICLE 22 INSURANCE

Changes have been made to the insurance provisions, including incorporating requirements that the insurance provided comply with recent NYC Department of Buildings regulations specifying required dollar limits for CGL insurance for certain projects and requiring proof of builder's risk insurance prior to Work commencing rather than within 10 days of award.

ARTICLE 26 EXTRA WORK

The percentage paid for overhead for Extra Work pursuant to Section 26.1.11 is increased from 10% to 12% and the calculation of Worker's Compensation insurance costs reimbursed for Extra Work has been clarified.

ARTICLE 37 LABOR LAW REQUIREMENTS
ARTICLE 38 PAYROLL REPORTS

The provisions governing Labor Law provisions have been tightened, including requirements the employee identification cards include a photo (unless the requirement is waived), a prohibition on cash payments to employees and subcontractors, and clear enforcement authority requirements.

ARTICLE 70 ELECTRONIC FILING

A provision is added to make mandatory the electronic filing of certain alteration permits with the Department of Buildings.

Other significant changes include the following:

ARTICLE 7 INDEMNIFICATION

Changes have been made to the indemnification provisions.

ARTICLE 14 FINAL ACCEPTANCE OF WORK
ARTICLE 44 SUBSTANTIAL COMPLETION PAYMENT

The Commissioner is no longer required to issue a substantial completion determination in addition to the already existing requirement that the Engineer issue a substantial completion determination and reach an agreement on a punch list of remaining work. Now, the Engineer, when issuing the punch list to the Contractor, must also include a proposed schedule for the completion of the punch list. The Contractor may propose an alternative schedule that is subject to the approval of the Engineer. If the Contractor fails to respond to the Engineer's proposed schedule, the Engineer's schedule is deemed accepted.

ARTICLE 15 LIQUIDATED DAMAGES

The contract is revised to match Schedule A to provide that liquidated damages are available only until substantial completion.

ARTICLE 17 SUBCONTRACTS

The requirements for prior approval of subcontractors, and for contractors to be responsible for the actions of their subcontractors, have been tightened. The requirement that the Contractor list subcontractors in the City's Payee Information Portal has been added; the provision was previously attached as a rider.

ARTICLE 19 SECURITY DEPOSIT

The provisions governing the return of bid deposits are clarified.

ARTICLE 20 PAYMENT GUARANTEE

The Payment Guaranty provisions, which apply when the City does not require the Contractor to obtain payment bonds, has been significantly revised to track the requirements of State Finance law 137.

ARTICLE 28 RECORDKEEPING FOR EXTRA OR DISPUTED WORK

The recordkeeping requirement that currently apply to payments for Time & Materials for extra work are expressly made applicable to regular work that is paid for on a T & M basis.

ARTICLE 35 EMPLOYEES

The whistleblower provisions of local law are added to the construction contract. They previously have been attached as a rider.

ARTICLE 38 PAYROLL REPORTS ARTICLE 77 RECORDS RETENTION

Requirements that records be maintained for six years and directions on how such records must be made available.

ARTICLE 42 PARTIAL PAYMENTS

Increased flexibility has been provided for when contractors may submit invoices.

ARTICLE 62 TAX EXEMPTION

The provisions identifying the State tax exemption for municipalities are revised to more clearly describe State law.

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NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (DEC. 2013)
INSURANCE RIDER

The following provisions supersede the corresponding provisions in the December 2013 version of the New York City Standard Construction Contract:

1. Section 22.1.1(c) provides as follows:

22.1.1(c) If the **Work** requires a permit from the Department of Buildings pursuant to 1 RCNY Section 101-08, the **Contractor** shall provide Commercial General Liability Insurance with limits of at least those required by 1 RCNY section 101-08 or greater limits provided by the Agency in Schedule A. If the Work does not require such a permit, the minimum limits shall be those provided for in Schedule A.

2. Section 22.3.3 provides as follows:

22.3.3 For policies provided pursuant to all of Article 22.1 other than Article 22.1.2, the **Contractor** shall submit one or more Certificates of Insurance on forms acceptable to the **Commissioner**. All such Certificates of Insurance shall certify (a) the issuance and effectiveness of such policies of insurance, each with the specified minimum limits (b) for insurance secured pursuant to Article 22.1.1 that the **City** and any other entity specified in Schedule A is an Additional Insured thereunder; (c) in the event insurance is required pursuant to Article 22.1.6 and/or Article 22.1.7, that the **City** is an Additional Insured thereunder; and (d) the company code issued to the insurance company by the National Association of Insurance Commissioners (the NAIC number). All such Certificates of Insurance shall be accompanied by the required additional insured endorsements and either a duly executed "Certification by Insurance Broker or Agent" in the form contained in Part III of Schedule A or copies of all policies referenced in such Certificate of Insurance as certified by an authorized representative of the issuing insurance carrier. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

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HIRING AND EMPLOYMENT RIDER:
HIRENYC AND REPORTING REQUIREMENTS

Introduction

This Rider shall apply to all contracts for goods, services, and construction with a value of one million dollars (\$1,000,000.00) or more, provided, however, that certain requirements of the Rider shall only apply as indicated below. This Rider addresses the HireNYC process, including reporting obligations under the HireNYC process, and certain other reporting requirements imposed by law. In general, the HireNYC process under this Rider requires the Contractor to enroll with the HireNYC portal for the City of New York ("the City") found within the Department of Small Business Services's ("SBS") website, to disclose all entry to mid-level job opportunities described in this Rider arising from this contract and located in New York City, and to agree to interview qualified candidates from HireNYC for those opportunities.

HireNYC Requirements

A. Enrollment

The Contractor shall enroll with the HireNYC system, found at www.nyc.gov/sbs, within thirty (30) days after the registration of this Contract pursuant to Section 328 of the New York City Charter. The Contractor shall provide information about the business, designate a primary contact and say whether it intends to hire for any entry to mid-level job opportunities arising from this contract and located in New York City, and, if so, the approximate start date of the first hire.

B. Job Posting Requirements

Once enrolled in HireNYC, the Contractor agrees to update the HireNYC portal with all entry to mid-level job opportunities arising from this contract and located in New York City, if any, which shall be defined as jobs requiring no more than an associate degree, as provided by the New York State Department of Labor (see Column F of <https://labor.ny.gov/stats/2012-2022-NYS-Employment-Prospects.xls>). The information to be updated includes the types of entry and mid-level positions made available from the work arising from the contract and located in New York City, the number of positions, the anticipated schedule of initiating the hiring process for these positions, and the contact information for the Contractor's representative charged with overseeing hiring. The Contractor must update the HireNYC portal with any hiring needs arising from the contract and located in New York City, and the requirements of the jobs to be filled, no less than three weeks prior to the intended first day of employment for each new position, except with the permission of SBS, not to be unreasonably withheld, and must also update the HireNYC portal as set forth below.

After enrollment through HireNYC and submission of relevant information, SBS will work with the Contractor to develop a recruitment plan which will outline the candidate screening process,

and will provide clear instructions as to when, where, and how interviews will take place. HireNYC will screen applicants based on employer requirements and refer applicants whom it believes are qualified to the Contractor for interviews. The Contractor must interview referred applicants whom it believes are qualified.

After completing an interview of a candidate referred by HireNYC, the Contractor must provide feedback via the portal within twenty (20) business days to indicate which candidates were interviewed and hired, if any. In addition, the Contractor shall provide the start date of new hires, and additional information reasonably related to such hires, within twenty (20) business days after the start date. In the event the Contractor does not have any job openings covered by this Rider in any given year, the Contractor shall be required to provide an annual update to HireNYC to that effect. For this purpose, the reporting year shall run from the date of the registration of the contract and each anniversary date.

These requirements do not limit the Contractor's ability to assess the qualifications of prospective workers, and to make final hiring and retention decisions. No provision of this Rider shall be interpreted so as to require the Contractor to employ any particular worker.

In addition, the provisions of this Rider shall not apply to positions that the Contractor intends to fill with employees employed pursuant to the job retention provision of Section 22-505 of the Administrative Code of the City of New York. The Contractor shall not be required to report such openings with HireNYC. However, the Contractor shall enroll with the HireNYC system pursuant to Section A, above, and, if such positions subsequently become open, then the remaining provisions of this Rider will apply.

C. Breach and Liquidated Damages

If the Contractor fails to comply with the terms of the contract and this Rider (1) by not enrolling its business with HireNYC; (2) by not informing HireNYC, as required, of open positions; or (3) by failing to interview a qualified candidate, the contracting agency may assess liquidated damages in the amount of two-thousand five hundred dollars (\$2,500.00) per breach. For all other events of noncompliance with the terms of this Rider, the agency may assess liquidated damages in the amount of five hundred dollars (\$500) per breach.

Furthermore, in the event the Contractor breaches the requirements of this Rider during the term of the contract, the City may hold the Contractor in default of this contract.

Audit Compliance

In addition to the auditing requirements set forth in other parts of the contract, the Contractor shall permit SBS and the City to inspect any and all records concerning or relating to job openings or the hiring of individuals for work arising from the contract and located in New York City. The Contractor shall permit an inspection within seven (7) business days of the request.

Other Reporting Requirements

The Contractor shall report to the City, on a monthly basis, all information reasonably requested by the City that is necessary for the City to comply with any reporting requirements imposed by law or rule, including any requirement that the City maintain a publicly accessible database. In addition, the Contractor agrees to comply with all reporting requirements imposed by law or rule, or as otherwise requested by the City.

Construction Requirements

Construction contractors shall comply with the HireNYC requirements set forth above for all non-trades jobs (e.g., for an administrative position arising out of the work of the contract and located in New York City) as set forth above.

In addition, construction contractors shall reasonably cooperate with SBS and the City on specific outreach events, including Hire on the Spot events, for the hiring of trades workers for the work of this contract.

Further, this contract shall be subject to a project labor agreement if so required elsewhere in this contract.

Federal Hiring Requirements

The Contractor shall comply with all federal hiring requirements as may be set forth elsewhere in this contract, including, as applicable:

- Section 3 of the HUD Act of 1968, which requires, to the greatest extent feasible, economic opportunities for 30 percent of new hires be given to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.
- Executive Order 11246, which prohibits discrimination in employment due to race, color, religion, sex or national origin, and requires the implementation of goals for minority and female participation for work involving any Construction trade.

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PAID SICK LEAVE LAW CONTRACT RIDER

Introduction and General Provisions

The Earned Sick Time Act, also known as the Paid Sick Leave Law ("PSLL"), requires covered employees who annually perform more than 80 hours of work in New York City to be provided with paid sick time.¹ Contractors of the City of New York or of other governmental entities may be required to provide sick time pursuant to the PSLL.

The PSLL became effective on April 1, 2014, and is codified at Title 20, Chapter 8, of the New York City Administrative Code. It is administered by the City's Department of Consumer Affairs ("DCA"); DCA's rules promulgated under the PSLL are codified at Chapter 7 of Title 6 of the Rules of the City of New York ("Rules").

Contractor agrees to comply in all respects with the PSLL and the Rules, and as amended, if applicable, in the performance of this agreement. Contractor further acknowledges that such compliance is a material term of this agreement and that failure to comply with the PSLL in performance of this agreement may result in its termination.

Contractor must notify the Agency Chief Contracting Officer of the City agency or other entity with whom it is contracting in writing within ten (10) days of receipt of a complaint (whether oral or written) regarding the PSLL involving the performance of this agreement. Additionally, Contractor must cooperate with DCA's education efforts and must comply with DCA's subpoenas and other document demands as set forth in the PSLL and Rules.

The PSLL is summarized below for the convenience of Contractor. Contractor is advised to review the PSLL and Rules in their entirety. On the website www.nyc.gov/PaidSickLeave there are links to the PSLL and the associated Rules as well as additional resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which Contractor can get more information about how to comply with the PSLL. Contractor acknowledges that it is responsible for compliance with the PSLL notwithstanding any inconsistent language contained herein.

Pursuant to the PSLL and the Rules:

Applicability, Accrual, and Use

An employee who works within the City of New York for more than eighty hours in any consecutive 12-month period designated by the employer as its "calendar year" pursuant to the PSLL ("Year") must be provided sick time. Employers must provide a minimum of one hour of sick time for every 30 hours worked by an employee and compensation for such sick time must

¹ Pursuant to the PSLL, if fewer than five employees work for the same employer, as determined pursuant to New York City Administrative Code §20-912(g), such employer has the option of providing such employees uncompensated sick time.

be provided at the greater of the employee's regular hourly rate or the minimum wage. Employers are not required to provide more than forty hours of sick time to an employee in any Year.

An employee has the right to determine how much sick time he or she will use, provided that employers may set a reasonable minimum increment for the use of sick time not to exceed four hours per day. In addition, an employee may carry over up to forty hours of unused sick time to the following Year, provided that no employer is required to allow the use of more than forty hours of sick time in a Year or carry over unused paid sick time if the employee is paid for such unused sick time and the employer provides the employee with at least the legally required amount of paid sick time for such employee for the immediately subsequent Year on the first day of such Year.

An employee entitled to sick time pursuant to the PSLI may use sick time for any of the following:

- such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;
- such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild or grandparent, or the child or parent of an employee's spouse or domestic partner) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;
- closure of such employee's place of business by order of a public official due to a public health emergency; or
- such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency.

An employer must not require an employee, as a condition of taking sick time, to search for a replacement. However, an employer may require an employee to provide: reasonable notice of the need to use sick time; reasonable documentation that the use of sick time was needed for a reason above if for an absence of more than three consecutive work days; and/or written confirmation that an employee used sick time pursuant to the PSLI. However, an employer may not require documentation specifying the nature of a medical condition or otherwise require disclosure of the details of a medical condition as a condition of providing sick time and health information obtained solely due to an employee's use of sick time pursuant to the PSLI must be treated by the employer as confidential.

If an employer chooses to impose any permissible discretionary requirement as a condition of using sick time, it must provide to all employees a written policy containing those requirements, using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny sick time to an employee because of non-compliance with such a policy.

Sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the sick time was used.

Exemptions and Exceptions

Notwithstanding the above, the PSLL does not apply to any of the following:

- an independent contractor who does not meet the definition of employee under section 190(2) of the New York State Labor Law;
- an employee covered by a valid collective bargaining agreement in effect on April 1, 2014 until the termination of such agreement;
- an employee in the construction or grocery industry covered by a valid collective bargaining agreement if the provisions of the PSLL are expressly waived in such collective bargaining agreement;
- an employee covered by another valid collective bargaining agreement if such provisions are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the PSLL for such employee;
- an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines his or her own schedule, has the ability to reject or accept any assignment referred to him or her, and is paid an average hourly wage that is at least four times the federal minimum wage;
- an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;
- an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or
- a participant in a Work Experience Program (WEP) under section 336-c of the New York State Social Services Law.

Retaliation Prohibited

An employer may not threaten or engage in retaliation against an employee for exercising or attempting in good faith to exercise any right provided by the PSLL. In addition, an employer may not interfere with any investigation, proceeding, or hearing pursuant to the PSLL.

Notice of Rights

An employer must provide its employees with written notice of their rights pursuant to the PSLL. Such notice must be in English and the primary language spoken by an employee, provided that DCA has made available a translation into such language. Downloadable notices are available on DCA's website at <http://www.nyc.gov/html/dca/html/law/PaidSickLeave.shtml>.

Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed fifty dollars for each employee who was not given appropriate notice.

Records

An employer must retain records documenting its compliance with the PSLL for a period of at least three years, and must allow DCA to access such records in furtherance of an investigation related to an alleged violation of the PSLL.

Enforcement and Penalties

Upon receiving a complaint alleging a violation of the PSLL, DCA has the right to investigate such complaint and attempt to resolve it through mediation. Within 30 days of written notification of a complaint by DCA, or sooner in certain circumstances, the employer must provide DCA with a written response and such other information as DCA may request. If DCA believes that a violation of the PSLL has occurred, it has the right to issue a notice of violation to the employer.

DCA has the power to grant an employee or former employee all appropriate relief as set forth in New York City Administrative Code 20-924(d). Such relief may include, among other remedies, treble damages for the wages that should have been paid, damages for unlawful retaliation, and damages and reinstatement for unlawful discharge. In addition, DCA may impose on an employer found to have violated the PSLL civil penalties not to exceed \$500 for a first violation, \$750 for a second violation within two years of the first violation, and \$1,000 for each succeeding violation within two years of the previous violation.

More Generous Policies and Other Legal Requirements

Nothing in the PSLL is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous sick time policy, or the obligation of an employer to comply with any contract, collective bargaining agreement, employment benefit plan or other agreement providing more generous sick time. The PSLL provides minimum requirements pertaining to sick time and does not preempt, limit or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of sick leave or time, whether paid or unpaid, or that extends other protections to employees. The PSLL may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

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

INFORMATION FOR BIDDERS

December 2013

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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

June 2015

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

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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); 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 16 NYCRR Part 753
- ☐ Title 15 of the Rules of the City of New York, Chapter 13 Citywide Construction Dust Mitigation
- ☐ Manual on Uniform Traffic Control Devices (MUTCD)
- ☐ Title 15 of the Rules of the City of New York, Chapter 28 Citywide Construction Noise Mitigation

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 QA&CS 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 QA&CS within the Division of Program Management/ Safety & Site 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").

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Daily Safety Job Briefing: Daily jobsite safety meetings, giving to all jobsite personnel by contractor, with the purpose of discussing project specific safety procedures for the scheduled construction work.

Director - Quality Assurance and Construction Safety (QA&CS): Responsible for the operations of the QACS Construction Safety Unit and the DDC Site Safety management programs.

Job Hazard Analysis (JHA): A process of identifying the major job steps and any potential site-specific hazards that may be present during construction and establishing the means and methods to eliminate or control those hazards.

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.

Project Site: Those areas indicated in the Contract Documents where the Work is to be performed.

Project Safety Representative: The designated project safety representative shall have completed an authorized 30 hour OSHA Construction Safety Course and other safety training applicable to Contractor's/subcontractor's project work. Except in instances where a dedicated Project Safety Manager is required, a Project Safety Representative may also function as a superintendent, foreman or crew leader on the Project, but must have sufficient experience and authority to undertake corrective actions and must qualify to be a competent person. No work is to be performed on site when a Project Safety Representative is not present.

Project Safety Manager: A dedicated, full-time project safety manager may be a contractual requirement on large projects or projects deemed by DDC to be particularly high risk. This would be in addition or in lieu of a Contractor's Project Safety Representative. This individual shall not have any other assigned duties. This individual shall have received, at a minimum an authorized 30 hour OSHA Construction Safety Course. Other examples of acceptable training are OSHA Safety and Health Standards for the Construction Industry training program (OSHA 510), Certified Safety Professional (CSP), Certified Industrial Hygienist (CIH) or a degree/certificate in a safety and health from a college-level curriculum.

A Project Safety Manager shall possess the additional training, years of experience, and skills necessary to thoroughly understand the health and safety hazards and controls for large construction projects, including the full scope of the specific Work.

QA&CS -- Quality Assurance and Construction Safety of the New York City Department of Design and Construction.

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 Construction Management firm, 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 Manager: For certain projects, as defined in NYC Construction Codes -- Title 28, the Contractor shall provide a Site Safety Manager with a Site Safety Manager License issued by the NYC Department of Building.

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 procedures and training appropriate and

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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.

Work: The construction required by the Contract Documents whether completed or partially completed, performed by the Contractor/ subcontractors. Work refers to the furnishing of labor, furnishing and incorporating materials and equipment into the construction and providing any service required by the Contract Documents to fulfill the Contractor's obligation to complete the Project.

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. DDC or CM Resident Engineer / Construction Project 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 meetings and daily safety job briefings.
- 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 and Accident Notification and Response Protocol.
- Gathers facts related to all accidents and prepares DDC Construction Accident Report.
- Notifies the Construction Safety Unit within two (2) hours of the start of an inspection by any outside regulatory agency personnel, including OSHA, NYC DOB or others and forwards a copy of the inspection report within three days of its receipt.
- Monitors the conditions at the site for conformance with the contractor's 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 contractor's Site Safety Plan, applicable federal, state or local codes or any condition that presents a potential risk of injury to the public or workers or possible damage to property.
- Notifies DDC of any unsafe or unhealthy condition and directs the contractor to provide such labor, materials, equipment and supervision to abate such conditions.
- Escort and assist QA&CS Construction Safety Auditors during the field and record inspections.
- Reports emergency conditions to the Construction Safety Unit immediately.

B. Contractors

- Submit a completed Safety Questionnaire and other safety performance related documentation with its bid or as part of a pre-qualification package.
- Complete a written Job Hazard Analysis (JHA) that identifies safety hazards for project specific work tasks and hazard control methods. A written JHA shall be available at the site for reference and included in the Site Safety Plan submitted by the contractor.
- Submit a Site Safety Plan and Safety Program within 30 days from the Award Date 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.

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- Develop project specific safety procedures to protect general public during all construction activities for the duration of the project.
- Ensure that all employees are aware of the hazards associated with the project through documented formal and informal training and/or other communications. Conduct and document weekly safety meetings and daily job briefing sessions for the duration of the project. Documentation to be provided to the RE/CPM on a monthly basis.
- Name the Project Safety Representative and Project Safety Manager, if required. The Contractor will be required to identify the Project Safety Representative and Project Safety Manager in the Site Safety Plan. Resumes, outlining the qualification and experience for the Project Safety Representative and Project Safety Manager, shall be available upon request. DDC reserves the right to request that the Contractor replace any Project Safety Representative or Project Safety Manager for any reason at any time during the project.
- Name a Competent Person(s), The Contractor will be required to identify a Competent Person(s) 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.
- Conduct applicable safety training prior to the commencement of work at the site. All training records (OSHA 10-hour, flagger, scaffold, fall protection, confined space entry, etc.) shall be provided to the RE/CPM prior to mobilization, included in the Site Safety Plan, kept current during the course of the project, and available for review. Prior to performing any work on DDC project all employees shall have successfully completed, within the previous five calendar years, a 10 Hour OSHA construction safety course.
- As part of the Site Safety Plan, prepare a site specific programs and plans, such as MPT plan, steel erection plan, confined space program, fall protection plan, demolition plan, etc. (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 Project Safety Representative and/or Project Safety Manager will conduct this training prior to mobilization and provide documentation to the RE/CPM.
- 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 or unhealthy conditions to the RE/CPM as soon as practical, but no more than 24 hours after discovery, and take prompt actions to remove or abate such conditions.
- Report any accidents involving injuries to workers or the general public, as well as property damage, to the RE/CPM within one (1) hour.
- Following an accident, the Contractor shall not remove or alter any equipment, structure, material, or evidence related to the accident. Exception: Immediate emergency procedures taken to secure structures, temporary construction, operations, or equipment that pose a continued imminent danger or facilitate assistance for persons who are trapped or who have sustained bodily injury.
- Notify the RE/CPM within one (1) hour of the start of an inspection by any outside regulatory agency personnel, including OSHA, NYC DOB or others.
- Maintain all records pertaining to all required compliance documents and accident and injury reports.
- Address 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 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 company workers' compensation experience modification rating and OSHA Incident Rates for the three (3) years prior to the date of the bid opening. DDC may request a Contractor to update its Questionnaire at any time or to provide more detailed information. The Contractor must provide the requested information within 15 days.

The following criteria will be used by DDC in reviewing the Contractor's responsibility, which will be based on the information provided on the questionnaire:

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- Criteria 1: OSHA Injury and Illness Rates (I&IR) are no greater than the average for the industry (based on the most current Bureau of Labor Statistics data for the Contractors SIC code); and
- Criteria 2: Insurance workers compensation Experience Modification Rate (EMR) equal to or less than 1.0; and
- Criteria 3: Any willful violations issued by OSHA or NYC DOB within the last three (3) years; and
- Criteria 4: A fatality (worker or member of public) and injuries, requiring OSHA notification, experienced on or near Contractor's worksite within the last three (3) years; and
- Criteria 5: Past safety performance on DDC projects (accidents; status of safety program and site safety plan submittals; etc.)
- Criteria 6: OSHA violation history for the last three (3) years;
- Criteria 7: Contractor shall provide OSHA Injury and Illness Records (currently OSHA 300 and 300A Logs) for the last three (3) years.

If the Contractor fails to meet the basic criteria listed above, the Construction Safety Unit may request, through the ACCO, more details concerning the Contractor's safety experience. DDC may request the Contractor to provide copies of, among other things, accident investigation reports, OSHA records, OSHA and NYC DOB citations, EPA citations and written corrective action plan.

VI. SAFETY PROGRAM AND SITE SAFETY PLAN

Within thirty (30) days from the Award Date, 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 standards. The Site Safety Plan shall identify project work scope, safety hazards associated with the project tasks, and include specific safety procedures and training appropriate and necessary to complete the work. The 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.

Safety Program: Corporate Safety Program established by the Contractor that includes the Contractor's overall safety policy, regulatory compliance plan and basic safety procedures covering all aspects of construction operations, performed by the Contractor. The Safety Program shall be a written document with a separate section describing each element of the Safety Program. The Safety Program shall have at minimum the following elements applicable to the Contractor's operations:

- Responsibility and Organization – Contractor's company organization chart, including titles, names, contact information, roles and responsibilities for key personnel, etc.
- Safety Training Program – Contractor's corporate training program.
- Hazard Corrective Actions – Criteria for safety inspections, identification of safety non-compliances, implementation and verification of corrective actions, forms to document safety inspections results, etc.
- Accident/Exposure Investigation
- Recordkeeping and Reporting Injuries – Responsible staff; reporting and recording criteria; OSHA 300 and 300A form completion, etc.
- Fire Protection and Prevention Program
- Housekeeping
- Illumination
- Sanitation
- Personal Protective Equipment (PPE) – Company policy for the use of head protection, foot protection, hearing protection, eye and face protection, protective clothing, and any additional protective equipment based on work tasks; PPE inspection and replacement policy.
- Hazard Communication Program
- Employee Emergency Action Plan
- Protection of Underground Facilities and Utilities
- Ionizing/Nonionizing Radiation
- Material Handling, Storage, Use and Disposal
- Tools – Hand and Power
- Signs, Signals, and Barricades

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- Scaffold – Local Law 52 requirements, installation, use, inspection, dismantling, training and general safety requirements.
- Welding and Cutting
- Electrical Safety
- Fall Protection
- Cranes, Derrick, Hoists, Elevators, Conveyors
- Excavation Safety
- Concrete and Masonry Construction
- Maintenance and Protection of Traffic
- Steel Erection
- Demolition
- Blasting and the Use of Explosives
- Stairways and Ladders
- Toxic and Hazardous Substances
- Alcohol and Drug Abuse Policy
- Rodents and Vermin
- Occupational Noise Exposure
- Confined Space Program – General confined Space Program: training requirements, confined space hazard evaluation procedure, atmospheric testing procedure, confined space classification, permit-required procedure, communication procedure, rescue procedure, forms, etc.
- Construction Vehicles/Heavy Equipment
- Dust Control Procedures

Site Safety Plan: The Site Safety Plan shall be a written document and shall apply to all project specific Contractor and subcontractor operations, and shall have at a minimum, the following elements with each element described in a separate section (It may be necessary to modify the basic format for certain unique or high-risk projects, such as tunnels or high-rise construction):

- Project Work Scope – Detailed information regarding work tasks that will be performed by contractor and subcontractors under the project.
- Responsibility and Organization – Contractor's organization chart with responsible staff for the project, including titles, names, contact information, roles and responsibilities.
- Safety Training and Education – OSHA 10 Hours training, requirements for daily safety briefings and weekly safety meetings, any work task specific training, responsible staff for implementation of training program for the project.
- Job Hazard Analysis (JHA) – Project specific Job Hazard Analysis including work tasks, identified hazards, hazard control methods (administrative, engineering, PPE), contractor's name, project id, location, name and signature of a certifying person, hazard assessment date.
- Protection of Public
- Hazard Corrective Actions – Responsible staff, forms, frequency of safety inspections and implementation of corrective actions.
- Accident/Exposure Investigation – Accident/incident notification procedure of DDC project staff. Project specific procedures for accident investigation and implementation of corrective actions.
- First Aid and Medical Attention – Responsible staff, location and inspection of First Aid kit, directions to local hospitals; emergency telephone numbers.
- Project Specific Fire Protection and Prevention Program.
- Project Specific Illumination Procedure.
- Project Specific Sanitation Procedure.
- Personal Protective Equipment (PPE)
- Hazard Communication Program – Responsible staff; training; SDS records, project specific list of chemical; location of the program and SDS records.
- Means of Egress – Information regarding free and unobstructed egress from all parts of the building or structure; exit marking; maintenance of means of egress, etc.
- Employee Emergency Action Plan – Project specific: responsible staff, emergency alarm system, evacuation procedure, procedure to account for employees after evacuation, etc.
- Evacuation Plan – Project specific evacuation plan (drawing/scheme) with exists and evacuation routes.

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- Protection of Underground Facilities and Utilities, including responsible staff.
- Ionizing/Nonionizing Radiation - Competent person, license and qualification requirements, type of radiation, employees exposure and protection, etc.
- Material Handling, Storage, Use and Disposal - Project specific information regarding material storage and disposal.
- Signs, Signals, and Barricades - Use of danger/warning signs, sidewalk closure, safety instruction signs, pedestrian fencing and barricades, etc.
- Scaffold - Project specific scaffold types, training, scaffold drawings, competent person, criteria for project specific scaffold, falling object protection.
- Welding and Cutting - project specific procedure for welding and cutting, including all necessary safety requirements such as fire prevention, personal protective equipment, hot work permits, FDNY certificate requirements.
- Fall Protection - Project specific information regarding selected fall protection systems, fall protection plan.
- Cranes, Derrick, Hoists, Elevators, Conveyors - project specific equipment information including type, rated load capacity, manufacture specification requirements, competent person, exposure to falling load, inspection, recordkeeping, clearance requirements, communication procedure, ground lines, permits.
- Excavation Safety - Competent person, project specific protective system.
- Maintenance and Protection of Traffic Plan - Project specific MPT plan, flagmen training.
- Steel Erection - Site specific erection plan, requirements for applicable written notifications, competent person.
- Demolition - Engineering survey, including written evidence, disconnection of all effected utilities, identification of all hazardous chemicals, materials, gases, etc., floor openings, chutes, inspection and maintenance of all stairs/passageways, removal of materials/debris/structural elements, lock out/tag out, competent person.
- Blasting and the Use of Explosives - Project specific safety procedures, warning signs, training/qualification, transportation, storage and use of explosives, inspection.
- Toxic and Hazardous Substances - Safety procedures for substances to be used on project.
- Noise Mitigation Plan - Completed project specific Noise Mitigation Plan.
- Confined Space Program - Project specific Confined Space Program, responsible staff, training records, equipment information, rescue procedure, list of project specific confined spaces, forms.
- Construction Vehicles/Heavy Equipment - Type of construction vehicles/heavy equipment to be used on site.
- Dust Mitigation Plan - Completed project specific Dust Mitigation Plan.

The most critical component of the Site Safety Plan is the Job Hazard Analysis (JHA) section. The JHA form is a written document prepared by the contractor. The contractor must conduct a site and task assessment JHA to identify the major job steps and any potential safety or environmental hazards related to performance of the work, eliminate or implement controls for the potential hazards, and identify proper personal protective equipment for the task. The JHA shall be communicated to all contractor/subcontractor personnel on site.

The initial Job Hazard Assessment form shall be included in the contractor's Site Safety Plan and the current form shall be available at the construction site for reference.

Certain DDC programs, such as Job Order Contracting System (JOCS), may not necessarily require Site Safety Plans. The JOCS contractor shall submit a Safety Program. The Site Safety Plan requirement for the JOCS contractor will be determined by QA&CS based on a project work scope, construction activities and project location. In addition, certain DDC Operating Units may establish client-specific program or safety requirements. The contractor's Site Safety Plan must address such client-specific program or safety requirements.

VII. KICK-OFF MEETINGS/PRE-CONSTRUCTION AND SAFETY REVIEW

RE/CPM shall invite QA&CS Construction Safety Unit to the construction kick-off meeting. A QA&CS representative will participate in this meeting with the Contractor and RE/CPM prior to the start of the project for the purpose of:

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- 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 QA&CS 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 Project 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 have these records available upon request. Any critical deficiencies shall be immediately reported to QA&CS 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 - QA&CS, or his/her designee will meet with the Contractor's Project Safety Representative and or Project Safety Manager, the DDC Project Manager, the RE/CPM, and the DDC Environmental Specialist (if environmental issues are involved). The purpose of this meeting is to 1) determine the level of non-compliance; 2) explain and clarify the safety/environmental provisions; 3) agree on a future course of action to correct the deficiencies.
- D. If the deficiencies continue to occur with inadequate attention by the contractor, this shall, among other remedies available, be grounds for default.
- E. The contractor shall within 1 hour inform the RE/CPM/CM of all accidents/incidents including all fatalities, any injuries to employees or members of the general public, and property damage (e.g., structural damage, equipment rollovers, utility damage, loads dropped from crane). The RE/CPM shall notify the Construction Safety Unit as per DDC's Construction Safety Emergency and Accident Notification and Response Protocol and shall maintain a record of all contractor accidents/incidents for the project.
- F. The Construction Safety Unit shall be notified within two (2) hours of the start of any NYS-DOL/ NYC-COSH/ OSHA/ EPA inspections.

IX. SAFETY PERFORMANCE EVALUATION

The contractor's safety record, including accident/incident history and DDC safety inspection results, will be considered as part of the Contractor's performance evaluation at the conclusion of the project. Poor safety performance during the course of the project shall be a reason to rate a Contractor unsatisfactory which may 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.

CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT

December 2013

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

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WITNESSETH:

The parties, in consideration of the mutual agreements contained herein, agree as follows:

**CHAPTER I
THE CONTRACT AND DEFINITIONS**

ARTICLE 1. THE CONTRACT

1.1 Except for titles, subtitles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience), the following, except for such portions thereof as 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 All Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed or the Order to Work.

1.2 Should any conflict occur in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated the most expensive way of doing the Work, unless the Contractor shall have asked for and obtained a decision in writing from the Commissioner of the Agency that is entering into this Contract, before the submission of its bid, as to what shall govern.

ARTICLE 2. DEFINITIONS

2.1 The following words and expressions, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless a different meaning is clear from the context:

2.1.1 "Addendum" or "Addenda" shall mean the additional Contract provisions and/or technical clarifications issued in writing by the Commissioner prior to the receipt of bids.

2.1.2 "Agency" shall mean a city, county, borough or other office, position, department, division, bureau, board or commission, or a corporation, institution or agency of government, the expenses of which are paid in whole or in part from the City treasury.

2.1.3 "Agency Chief Contracting Officer" (ACCO) shall mean a person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the CCPO, or his/her duly authorized representative.

2.1.4 **"Allowance"** shall mean a sum of money which the Agency may include in the total amount of the Contract for such specific contingencies as the Agency believes may be necessary to complete the Work, e.g., lead or asbestos remediation, and for which the Contractor will be paid on the basis of stipulated unit prices or a formula set forth in the Contract or negotiated between the parties provided, however, that if the Contractor is not directed to use the Allowance, the Contractor shall have no right to such money and it shall be deducted from the total amount of the Contract.

2.1.5 **"City"** shall mean the City of New York.

2.1.6 **"City Chief Procurement Officer" (CCPO)** shall mean a person delegated authority by the Mayor to coordinate and oversee the procurement activity of Mayoral agency staff, including the ACCO and any offices which have oversight responsibility for the procurement of construction, or his/her duly authorized representative.

2.1.7 **"Commissioner"** shall mean the head of the Agency that has entered into this Contract, or his/her duly authorized representative.

2.1.8 **"Comptroller"** shall mean the Comptroller of the City of New York.

2.1.9 **"Contract"** or **"Contract Documents"** shall mean each of the various parts of the contract referred to in Article 1 hereof, both as a whole and severally.

2.1.10 **"Contract Drawings"** shall mean only those drawings specifically entitled as such and listed in the Specifications or in any Addendum, or any drawings furnished by the Commissioner, pertaining or supplemental thereto.

2.1.11 **"Contract Work"** shall mean everything required to be furnished and done by the Contractor by any one or more of the parts of the Contract referred to in Article 1, except Extra Work as hereinafter defined.

2.1.12 **"Contractor"** shall mean the entity which executed this Contract, whether a corporation, firm, partnership, joint venture, individual, or any combination thereof, and its, their, his/her successors, personal representatives, executors, administrators, and assigns, and any person, firm, partnership, joint venture, individual, or corporation which shall at any time be substituted in the place of the Contractor under this Contract.

2.1.13 **"Days"** shall mean calendar days, except where otherwise specified.

2.1.14 **"Engineer"** or **"Architect"** or **"Project Manager"** shall mean the person so designated in writing by the Commissioner in the Notice to Proceed or the Order to Work to act as such in relation to this Contract, including a private Architect or Engineer or Project Manager, as the case may be. Subject to written approval by the Commissioner, the Engineer, Architect or Project Manager may designate an authorized representative.

2.1.15 **"Engineering Audit Officer" (EAO)** shall mean the person so designated by the Commissioner to perform responsible auditing functions hereunder.

2.1.16 **"Extra Work"** shall mean Work other than that required by the Contract at the time of award which is authorized by the Commissioner pursuant to Chapter VI of this Contract.

2.1.17 **"Federal-Aid Contract"** shall mean a contract in which the United States (federal) Government provides financial funding as so designated in the Information for Bidders.

2.1.18 **"Final Acceptance"** shall mean final written acceptance of all the Work by the Commissioner, a copy of which shall be sent to the Contractor.

2.1.19 **"Final Approved Punch List"** shall mean a list, approved pursuant to Article 14.2.2, specifying those items of Work to be completed by the Contractor after Substantial Completion and dates for the completion of each item of Work.

2.1.20 **"Law"** or **"Laws"** shall mean the Constitution of the State of New York, the New York City Charter, the New York City Administrative Code, a statute of the United States or of the State of New York, a local law of the City of New York, any ordinance, rule or regulation having the force of law, or common law.

2.1.21 **"Materialman"** shall mean any corporation, firm, partnership, joint venture, or individual, other than employees of the Contractor, who or which contracts with the Contractor or any Subcontractor, to fabricate or deliver, or who actually fabricates or delivers, plant, materials or equipment to be incorporated in the Work.

2.1.22 **"Means and Methods of Construction"** shall mean the labor, materials, temporary structures, tools, plant, and construction equipment, and the manner and time of their use, necessary to accomplish the result intended by this Contract.

2.1.23 **"Notice to Proceed"** or **"Order to Work"** shall mean the written notice issued by the Commissioner specifying the time for commencement of the Work and the Engineer, Architect or Project Manager.

2.1.24 **"Other Contractor(s)"** shall mean any contractor (other than the entity which executed this Contract or its Subcontractors) who or which has a contract with the City for work on or adjacent to the building or Site of the Work.

2.1.25 **"Payroll Taxes"** shall mean State Unemployment Insurance (SUI), Federal Unemployment Insurance (FUI), and payments pursuant to the Federal Insurance Contributions Act (FICA).

2.1.26 **"Project"** shall mean the public improvement to which this Contract relates.

2.1.27 **"Procurement Policy Board" (PPB)** shall mean the Agency of the City of New York whose function is to establish comprehensive and consistent procurement policies and rules which shall have broad application throughout the City.

2.1.28 **"Required Quantity"** in a unit price Contract shall mean the actual quantity of any item of Work or materials which is required to be performed or furnished in order to comply with the Contract.

2.1.29 **"Resident Engineer"** shall mean the representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the Work.

2.1.30 **"Site"** shall mean the area upon or in which the Contractor's operations are carried on, and such other areas adjacent thereto as may be designated as such by the Engineer.

2.1.31 **"Small Tools"** shall mean items that are ordinarily required for a worker's job function, including but not limited to, equipment that ordinarily has no licensing, insurance

or substantive storage costs associated with it; such as circular and chain saws, impact drills, threaders, benders, wrenches, socket tools, etc.

2.1.32 "**Specifications**" shall mean all of the directions, requirements, and standards of performance applying to the Work as hereinafter detailed and designated under the Specifications.

2.1.33 "**Subcontractor**" shall mean any person, firm or corporation, other than employees of the Contractor, who or which contracts with the Contractor or with its subcontractors to furnish, or actually furnishes labor, or labor and materials, or labor and equipment, or superintendence, supervision and/or management at the Site. Wherever the word Subcontractor appears, it shall also mean sub-Subcontractor.

2.1.34 "**Substantial Completion**" shall mean the written determination by the Engineer that the Work required under this Contract is substantially, but not entirely, complete and the approval of the **Final Approved Punch List**.

2.1.35 "**Work**" shall mean all services required to complete the Project in accordance with the Contract Documents, including without limitation, labor, material, superintendence, management, administration, equipment, and incidentals, and obtaining any and all permits, certifications and licenses as may be necessary and required to complete the Work, and shall include both Contract Work and Extra Work.

CHAPTER II THE WORK AND ITS PERFORMANCE

ARTICLE 3. CHARACTER OF THE WORK

3.1 Unless otherwise expressly provided in the **Contract Drawings, Specifications, and Addenda**, the **Work** shall be performed in accordance with the best modern practice, utilizing, unless otherwise specified in writing, new and unused materials of standard first grade quality and workmanship 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 **City Department of Environmental Protection**.

5.3.2 The **Contractor** agrees to comply with Section 24-219 of the **Administrative Code** and implementing rules codified at 15 Rules of the **City of New York** ("**RCNY**") Section 28-100 *et seq.* In accordance with such provisions, the **Contractor**, if the **Contractor** is the responsible party under such regulations, shall prepare and post a Construction Noise Mitigation Plan at each **Site**, in which the **Contractor** shall certify that all construction tools and equipment have been maintained so that they operate at normal manufacturers operating specifications. If the **Contractor** cannot make this certification, it must have in place an Alternative Noise Mitigation Plan approved by the **City Department of Environmental Protection**. In addition, the **Contractor's** certified Construction Noise Mitigation Plan is subject inspection by the **City Department of Environmental Protection** in accordance with Section 28-101 of Title 15 of **RCNY**. No **Contract Work** may take place at a **Site** unless there is a Construction Noise Mitigation Plan or approved Alternative Noise Mitigation Plan in place. In addition, the **Contractor** shall create and implement a noise mitigation training program. Failure to comply with these requirements may result in fines and other penalties pursuant to the applicable provisions of the **Administrative Code** and **RCNY**.

5.4 Ultra Low Sulfur Diesel Fuel: In accordance with the provisions of Section 24-163.3 of the **Administrative Code**, the **Contractor** specifically agrees as follows:

5.4.1 Definitions. For purposes of this Article 5.4, the following definitions apply:

5.4.1(a) "**Contractor**" means any person or entity that enters into a Public Works Contract with a **City Agency**, or any person or entity that enters into an agreement with such person or entity, to perform work or provide labor or services related to such Public Works Contract.

5.4.1(b) "**Motor Vehicle**" means any self-propelled vehicle designed for transporting persons or property on a street or highway.

5.4.1(c) "**Nonroad Engine**" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under Section 7411 or Section 7521 of

Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.4.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower and greater, and that is not a Motor Vehicle or a vehicle used solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this term shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) horsepower or less and that are not used in any construction program or project.

5.4.1(e) "Public Works Contract" means a contract with a **City Agency** for a construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; a contract with a **City Agency** for the preparation for any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; or a contract with a **City Agency** for any final work involved in the completion of any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge.

5.4.1(f) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.4.2 Ultra Low Sulfur Diesel Fuel

5.4.2(a) All **Contractors** shall use Ultra Low Sulfur Diesel Fuel in diesel-powered Nonroad Vehicles in the performance of this **Contract**.

5.4.2(b) Notwithstanding the requirements of Article 5.4.2(a), **Contractors** may use diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) to fulfill the requirements of this Article 5.4.2, where the Commissioner of the City Department of Environmental Protection ("DEP Commissioner") has issued a determination that a sufficient quantity of Ultra Low Sulfur Diesel Fuel is not available to meet the needs of **Agencies** and **Contractors**. Any such determination shall expire after six (6) months unless renewed.

5.4.2(c) **Contractors** shall not be required to comply with this Article 5.4.2 where the **City Agency** letting this **Contract** makes a written finding, which is approved, in writing, by the DEP Commissioner, that a sufficient quantity of Ultra Low Sulfur Diesel Fuel, or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is not available to meet the requirements of Section 24-163.3 of the Administrative Code, provided that such **Contractor** in its fulfillment of the requirements of this **Contract**, to the extent practicable, shall use whatever quantity of Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is available. Any finding made pursuant to this Article 5.4.2(c) shall expire after sixty (60) **Days**, at which time the requirements of this Article 5.4.2 shall be in full force and effect unless the **City Agency** renews the finding in writing and such renewal is approved by the DEP Commissioner.

5.4.2(d) **Contractors** may check on determinations and approvals issued by the DEP Commissioner pursuant to Section 24-163.3 of the Administrative Code, if any, at www.dep.nyc.gov or by contacting the **City Agency** letting this **Contract**.

5.4.2(e) The requirements of this Article 5.4.2 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.3 Best Available Technology

5.4.3(a) All **Contractors** shall utilize the best available technology for reducing the emission of pollutants for diesel-powered Nonroad Vehicles in the performance of this **Contract**. For determinations of best available technology for each type of diesel-powered Nonroad Vehicle, **Contractors** shall comply with the regulations of the City Department of Environmental Protection, as and when adopted, Chapter 14 of Title 15 of the Rules of the City of New York (RCNY). The **Contractor** shall fully document all steps in the best available technology selection process and shall furnish such documentation to the **City Agency** or the DEP Commissioner upon request. The **Contractor** shall retain all documentation generated in the best available technology selection process for as long as the selected best available technology is in use.

5.4.3(b) No **Contractor** shall be required to replace best available technology for reducing the emission of pollutants or other authorized technology utilized for a diesel-powered Nonroad Vehicle in accordance with the provisions of this Article 5.4.3 within three (3) years of having first utilized such technology for such vehicle.

5.4.3(c) This Article 5.4.3 shall not apply to any vehicle used to satisfy the requirements of a specific Public Works Contract for fewer than twenty (20) **Days**.

5.4.3(d) The **Contractor** shall not be required to comply with this Article 5.4.3 with respect to a diesel-powered Nonroad Vehicle under the following circumstances:

5.4.3(d)(i) Where the **City Agency** makes a written finding, which is approved, in writing, by the DEP Commissioner, that the best available technology for reducing the emission of pollutants as required by this Article 5.4.3 is unavailable for such vehicle, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle.

5.4.3(d)(ii) Where the DEP Commissioner has issued a written waiver based upon the **Contractor** having demonstrated to the DEP Commissioner that the use of the best available technology for reducing the emission of pollutants might endanger the operator of such vehicle or those working near such vehicle, due to engine malfunction, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle, which would not endanger the operator of such vehicle or those working near such vehicle.

5.4.3(d)(iii) In determining which technology to use for the purposes of Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above, the **Contractor** shall primarily consider the reduction in emissions of particulate matter and secondarily consider the reduction in emissions of nitrogen oxides associated with the use of such

technology, which shall in no event result in an increase in the emissions of either such pollutant.

5.4.3(d)(iv) The **Contractor** shall submit requests for a finding or a waiver pursuant to this Article 5.4.3(d) in writing to the DEP Commissioner, with a copy to the ACCO of the City Agency letting this **Contract**. Any finding or waiver made or issued pursuant to Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above shall expire after one hundred eighty (180) Days, at which time the requirements of Article 5.4.3(a) shall be in full force and effect unless the City Agency renews the finding, in writing, and the DEP Commissioner approves such finding, in writing, or the DEP Commissioner renews the waiver, in writing.

5.4.3(e) The requirements of this Article 5.4.3 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.4 Section 24-163 of the Administrative Code. The **Contractor** shall comply with Section 24-163 of the Administrative Code related to the idling of the engines of motor vehicles while parking.

5.4.5 Compliance

5.4.5(a) The **Contractor's** compliance with Article 5.4 may be independently monitored. If it is determined that the **Contractor** has failed to comply with any provision of Article 5.4, any costs associated with any independent monitoring incurred by the City shall be reimbursed by the **Contractor**.

5.4.5(b) Any **Contractor** who violates any provision of Article 5.4, except as provided in Article 5.4.5(c) below, shall be liable for a civil penalty between the amounts of one thousand (\$1,000) and ten thousand (\$10,000) dollars, in addition to twice the amount of money saved by such **Contractor** for failure to comply with Article 5.4.

5.4.5(c) No **Contractor** shall make a false claim with respect to the provisions of Article 5.4 to a City Agency. Where a **Contractor** has been found to have done so, such **Contractor** shall be liable for a civil penalty of twenty thousand (\$20,000) dollars, in addition to twice the amount of money saved by such **Contractor** in association with having made such false claim.

5.4.6 Reporting

5.4.6(a) For all Public Works Contracts covered by this Article 5.4, the **Contractor** shall report to the City Agency the following information:

5.4.6(a)(i) The total number of diesel-powered Nonroad Vehicles used to fulfill the requirements of this Public Works Contract;

5.4.6(a)(ii) The number of such Nonroad Vehicles that were powered by Ultra Low Sulfur Diesel Fuel;

5.4.6(a)(iii) The number of such Nonroad Vehicles that utilized the best available technology for reducing the emission of pollutants, including a breakdown by vehicle model and the type of technology;

5.4.6(a)(iv) The number of such Nonroad Vehicles that utilized such other authorized technology in accordance with Article 5.4.3, including a breakdown by vehicle model and the type of technology used for each such vehicle;

5.4.6(a)(v) The locations where such Nonroad Vehicles were used; and

5.4.6(a)(vi) Where a determination is in effect pursuant to Article 5.4.2(b) or 5.4.2(c), detailed information concerning the **Contractor's** efforts to obtain Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm).

5.4.6(b) The **Contractor** shall submit the information required by Article 5.4.6(a) at the completion of **Work** under the Public Works Contract and on a yearly basis no later than August 1 throughout the term of the Public Works Contract. The yearly report shall cover **Work** performed during the preceding fiscal year (July 1 - June 30).

5.5 Ultra Low Sulfur Diesel Fuel. In accordance with the Coordinated Construction Act for Lower Manhattan, as amended:

5.5.1 Definitions. For purposes of this Article 5.5, the following definitions apply:

5.5.1(a) "Lower Manhattan" means the area to the south of and within the following lines: a line beginning at a point where the United States pierhead line in the Hudson River as it exists now or may be extended would intersect with the southerly line of West Houston Street in the Borough of Manhattan extended, thence easterly along the southerly side of West Houston Street to the southerly side of Houston Street, thence easterly along the southerly side of Houston Street to the southerly side of East Houston Street, thence northeasterly along the southerly side of East Houston Street to the point where it would intersect with the United States pierhead line in the East River as it exists now or may be extended, including tax lots within or immediately adjacent thereto.

5.5.1(b) "Lower Manhattan Redevelopment Project" means any project in Lower Manhattan that is funded in whole or in part with federal or State funding, or any project intended to improve transportation between Lower Manhattan and the two air terminals in the City known as LaGuardia Airport and John F. Kennedy International Airport, or between Lower Manhattan and the air terminal in Newark known as Newark Liberty International Airport, and that is funded in whole or in part with federal funding.

5.5.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.5.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower (HP) and greater, and that is not a Motor Vehicle or a vehicle used solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except

that this terms shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) HP or less and that are not used in any construction program or project.

5.5.1(e) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.5.2 Requirements. **Contractors** and **Subcontractors** are required to use only Ultra Low Sulfur Diesel Fuel to power the diesel-powered Nonroad Vehicles with engine HP rating of fifty (50) HP and above used on a Lower Manhattan Redevelopment Project and, where practicable, to reduce the emission of pollutants by retrofitting such Nonroad Vehicles with oxidation catalysts, particulate filters, or technology that achieves lowest particulate matter emissions.

5.6 Pesticides. In accordance with Section 17-1209 of the Administrative Code, to the extent that the **Contractor** or any **Subcontractor** applies pesticides to any property owned or leased by the **City**, the **Contractor**, and any **Subcontractor** shall comply with Chapter 12 of the Administrative Code.

5.7 Waste Treatment, Storage, and Disposal Facilities and Transporters. In connection with the **Work**, the **Contractor** and any **Subcontractor** shall use only those waste treatment, storage, and disposal facilities and waste transporters that possess the requisite license, permit or other governmental approval necessary to treat, store, dispose, or transport the waste, materials or hazardous substances.

5.8 Environmentally Preferable Purchasing. The **Contractor** shall ensure that products purchased or leased by the **Contractor** or any **Subcontractor** for the **Work** that are not specified by the **City** or are submitted as equivalents to a product specified by the **City** comply with the requirements of the New York City Environmentally Preferable Purchasing Program contained in Chapter 11 of Title 43 of the RCNY, pursuant to Chapter 3 of Title 6 of the Administrative Code.

ARTICLE 6. INSPECTION

6.1 During the progress of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall at all times afford the representatives of the **City** every reasonable, safe, and proper facility for inspecting all **Work** done or being done at the **Site** and also for inspecting the manufacture or preparation of materials and equipment at the place of such manufacture or preparation.

6.2 The **Contractor's** obligation hereunder shall include the uncovering or taking down of finished **Work** and its restoration thereafter; provided, however, that the order to uncover, take down and restore shall be in writing, and further provided that if **Work** thus exposed proves satisfactory, and if the **Contractor** has complied with Article 6.1, such uncovering or taking down and restoration shall be considered an item of **Extra Work** to be paid for in accordance with the provisions of Article 26. If the **Work** thus exposed proves unsatisfactory, the **City** has no obligation to compensate the **Contractor** for the uncovering, taking down or restoration.

6.3 Inspection and approval by the **Commissioner**, the **Engineer**, **Project Manager**, or **Resident Engineer**, of finished **Work** or of **Work** being performed, or of materials and equipment at the place of manufacture or preparation, shall not relieve the **Contractor** of its obligation to perform the **Work** in strict accordance with the **Contract**. Finished or unfinished **Work** not found to be in strict accordance with the **Contract** shall be replaced as directed by the **Engineer**, even though such **Work** may have been previously approved and paid for. Such corrective **Work** is **Contract Work** and shall not be deemed **Extra Work**.

6.4 Rejected **Work** and materials shall be promptly taken down and removed from the Site, which must at all times be kept in a reasonably clean and neat condition.

**ARTICLE 7. PROTECTION OF WORK AND OF PERSONS
AND PROPERTY; 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 all persons and the property of the City and of others from damage, loss or injury resulting from the **Contractor's**, and/or its **Subcontractors'** operations under this **Contract**. The **Contractor's** obligation to protect shall include the duty to provide, place or replace, and adequately maintain at or about the Site suitable and sufficient protection such as lights, barricades, and enclosures.

7.3 The **Contractor** shall comply with the notification requirements set forth below in the event of any loss, damage or injury to **Work**, persons or property, or any accidents arising out of the operations of the **Contractor** and/or its **Subcontractors** under this **Contract**.

7.3.1 The **Contractor** shall make a full and complete report in writing to the **Resident Engineer** within three (3) **Days** after the occurrence.

7.3.2 The **Contractor** shall also send written notice of any such event to all insurance carriers that issued potentially responsive policies (including commercial general liability insurance carriers for events relating to the **Contractor's** own employees) no later than twenty (20) days after such event and again no later than twenty (20) days after the initiation of any claim and/or action resulting therefrom. Such notice shall contain the following information: the number of the insurance policy, the name of the Named Insured, the date and location of the incident, and the identity of the persons injured or property damaged. For any policy on which the City and/or the **Engineer, Architect, or Project Manager** are Additional Insureds, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Additional Insured, such other Additional Insureds, as well as the Named Insured."

7.3.2(a) Whenever such notice is sent under a policy on which the City is an Additional Insured, the **Contractor** shall provide copies of the notice to the **Comptroller**, the **Commissioner** and the City Corporation Counsel. The copy to the **Comptroller** shall be sent to the Insurance Unit, NYC Comptroller's Office, 1 Centre Street - Room 1222, New York, New York, 10007. The copy to the **Commissioner** shall be sent to the address set forth in Schedule A of the General Conditions. The copy to the City Corporation Counsel shall be sent to Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

7.3.2(b) If the **Contractor** fails to provide any of the foregoing notices to 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 defend, indemnify, and hold the **City**, its employees, and officials (the "Indemnitees") harmless against any and all claims (including but not limited to claims asserted by any employee of the **Contractor** and/or its **Subcontractors**) and costs and expenses of whatever kind (including but not limited to payment or reimbursement of attorneys' fees and disbursements) allegedly arising out of or in any way related to the operations of the **Contractor** and/or its **Subcontractors** in the performance of this **Contract** or from the **Contractor's** and/or its **Subcontractors'** failure to comply with any of the provisions of this **Contract** or of the **Law**. Such costs and expenses shall include all those incurred in defending the underlying claim and those incurred in connection with the enforcement of this Article 7.4 by way of cross-claim, third-party claim, declaratory action or otherwise. The parties expressly agree that the indemnification obligation hereunder contemplates (1) full indemnity in the event of liability imposed against the Indemnitees without negligence and solely by reason of statute, operation of **Law** or otherwise; and (2) partial indemnity in the event of any actual negligence on the part of the Indemnitees either causing 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 provisions of this Article 7 shall not be deemed to create any new right of action in favor of third parties against the **Contractor** or the **City**.

CHAPTER III TIME PROVISIONS

ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK

8.1 The **Contractor** shall commence the **Work** on the date specified in the **Notice to Proceed** or the **Order to Work**. The time for performance of the **Work** under the **Contract** shall be computed from the date specified in the **Notice to Proceed** or the **Order to Work**. **TIME BEING OF THE ESSENCE** to the **City**, the **Contractor** shall thereafter prosecute the **Work** diligently, using such **Means and Methods of Construction** as are in accord with Article 4 herein and as will assure its completion not later than the date specified in this **Contract**, or on the date to which the time for completion may be extended.

ARTICLE 9. PROGRESS SCHEDULES

9.1 To enable the **Work** to be performed in an orderly and expeditious manner, the **Contractor**, within fifteen (15) **Days** after the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Engineer**, shall submit to the **Engineer** a proposed progress schedule based on the Critical Path Method 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**, including the anticipated time for obtaining required approvals pursuant to Article 10; and

9.1.4 The estimated amount in dollars the **Contractor** will claim on a monthly basis.

9.2 The proposed schedule shall be revised as directed by the **Engineer**, until finally approved by the **Engineer**, and after such approval, subject to the provisions of Article 11, shall be strictly adhered to by the **Contractor**.

9.3 If the **Contractor** shall fail to adhere to the approved progress schedule, or to the schedule as revised pursuant to Article 11, it shall promptly adopt such other or additional **Means and Methods of Construction**, at its sole cost and expense, as will make up for the time lost and will assure completion in accordance with the approved progress schedule. The approval by the **City** of a progress schedule which is shorter than the time allotted under the **Contract** shall not create any liability for the **City** if the approved progress schedule is not met.

9.4 The **Contractor** will not receive any payments until the proposed progress schedule is submitted.

ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL

10.1 From time to time as the **Work** progresses and in the sequence indicated by the approved progress schedule, the **Contractor** shall submit to the **Engineer** a specific request in writing for each item of information or approval required by the **Contractor**. These requests shall state the latest date upon which the information or approval is actually required by the **Contractor**, and shall be submitted in a reasonable time in advance thereof to provide the **Engineer** a sufficient time to act upon such submissions, or any necessary re-submissions thereof.

10.2 The **Contractor** shall not have any right to an extension of time on account of delays due to the **Contractor's** failure to submit requests for the required information or the required approval in accordance with the above requirements.

ARTICLE 11. NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY

11.1 After the commencement of any condition which is causing or may cause a delay in completion of the **Work**, including conditions for which the **Contractor** may be entitled to an extension of time, the following notifications and submittals are required:

11.1.1 Within 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 11, 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 Article 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 strictly 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.

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 provided, however, that the amount of compensation due to the **Contractor** will not be determined until the **Commissioner** determines that the **Work** is delayed after the date set for substantial completion.

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 **Commissioner** 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 the **Work** for a period exceeding thirty (30) **Days**, that was not brought about through any action or omission of the **Contractor**.

11.4.1.5 Differing site conditions that were neither known nor reasonably ascertainable on a pre-bid inspection of the **Site** or review of the bid documents or other publicly available sources, and that are not ordinarily encountered in the **Project's** geographical area or neighborhood or in the type of **Work** to be performed.

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

11.4.1.7 Delays not contemplated by the parties;

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

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

11.4.2 No claim may be made for any alleged delay in **Substantial Completion** of the **Work** by a date earlier than the date of **Substantial Completion** provided for in Schedule A unless there is a provision in the **Contract** providing for additional compensation for early completion. No claim may be made for any alleged delay in **Substantial Completion** of the **Work** if the work is substantially completed by the date of **Substantial Completion** provided for in Schedule A unless acceleration has been directed by the **Commissioner** to meet the date of **Substantial Completion** set forth in Schedule A.

11.4.3 The provisions of this Article 11 apply only to claims for additional costs attributable to delay and do not preclude determinations by the **Commissioner** allowing reimbursements for additional costs for **Extra Work** pursuant to Articles 25 and 26 of this **Contract**. To the extent that any cost attributable to delay is reimbursed as part of a change order, no additional claim for compensation under this Article 11 shall be allowed.

11.5 Non-Compensable Delays. The **Contractor** agrees to make no claim for, and is deemed to have included in its bid prices for the various items of the **Contract**, the extra/additional costs attributable to any delays caused by or attributable to the items set forth below. For such items, the **Contractor** shall be compensated, if at all, solely by an extension of time to complete the performance of the **Work**, in accordance with the provisions of Article 13. Such extensions of time will be granted, if at all, pursuant to the grounds set forth in Article 13.3.

11.5.1 The acts or omissions of any third parties, including but not limited to **Other Contractors**, public/ governmental bodies (other than **City Agencies**), utilities or private enterprises, who are disclosed in the **Contract Documents** or are ordinarily encountered or generally recognized as related to the **Work**;

11.5.2 Any situation which was within the contemplation of the parties at the time of entering into the **Contract**, including any delay indicated or disclosed in the **Contract Documents** or 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, lockout or similar situation;

11.5.5 Any shortages of supplies or materials, or unavailability of equipment, required by the **Contract Work**;

11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God, or acts of war or of the public enemy or terrorist acts, including the **City's** reasonable responses thereto; and

11.5.7 **Extra Work** which does not significantly affect the overall completion of the **Contract**, reasonable delays in the review or issuance of change orders or field orders and/or in shop drawing reviews or approvals.

11.6 Required Content of Submission of Statement of Delay Damages

11.6.1 In the verified written statement of delay damages required by Article 11.1.2, the following information shall be provided by the **Contractor**:

11.6.1.1 For each delay, the start and end dates of the claimed periods of delay and, in addition, a description of the operations that were delayed, an explanation of how they were delayed, and the reasons for the delay, including identifying the applicable act or omission of the **City** listed in Article 11.4.

11.6.1.2 A detailed factual statement of the claim providing all necessary dates, locations and items of **Work** affected by the claim.

11.6.1.3 The 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 Article 11.7.

11.6.1.4 Any additional information requested by the **Commissioner**.

11.7 Recoverable Costs

11.7.1 Delay damages may be recoverable for the following costs actually and necessarily incurred in the performance of the **Work**:

11.7.1.1 Direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits, based on time and materials records;

11.7.1.2 Necessary materials (including transportation to the **Site**), based on time and material records;

11.7.1.3 Reasonable rental value of necessary plant and equipment other than small tools, plus fuel/energy costs according to the applicable formula set forth in Articles 26.2.4 and/or 26.2.8, based on time and material records;

11.7.1.4 Insurance and bond costs;

11.7.1.5 Extended field office costs;

11.7.1.6 Extended **Site** overhead; and

11.7.1.7 Extended home office overhead.

11.7.2 Recoverable Subcontractor Costs. When the **Work** is performed by a **Subcontractor**, the **Contractor** may be paid the actual and necessary costs of such subcontracted **Work** as outlined above in Articles 11.7.1.1 through 11.7.1.6, and an

additional overhead of five (5%) percent of the costs outlined in Articles 11.7.1.1 through 11.7.1.3.

11.7.3 Non-Recoverable Costs. The parties agree that the **City** will have no liability for the following items and the **Contractor** agrees it shall make no claim for the following items:

11.7.3.1 Profit, or loss of anticipated or unanticipated profit;

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, pursuant to Article 11.1.3 above, that a compensable delay has occurred and agree on the amount of compensation, payment may be made pursuant to a written change order. Payment pursuant to such change order is subject to pre-audit by the **Engineering Audit Officer**, and may be post-audited by the **Comptroller** and/or the **Agency**.

ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS

12.1 During the progress of the **Work**, **Other Contractors** may be engaged in performing other work or may be awarded other contracts for additional work on this **Project**. In that event, the **Contractor** shall coordinate the **Work** to be done hereunder with the work of such **Other Contractors** and the **Contractor** shall fully cooperate with such **Other Contractors** and carefully fit its own **Work** to that provided under other contracts as may be directed by the **Engineer**. The **Contractor** shall not commit or permit any act which will interfere with the performance of work by any **Other Contractors**.

12.2 If the **Engineer** determines that the **Contractor** is failing to coordinate its **Work** with the work of **Other Contractors** as the **Engineer** has directed, then the **Commissioner** shall have the right to withhold any payments otherwise due hereunder until the **Contractor** completely complies with the **Engineer's** directions.

12.3 The **Contractor** shall notify the **Engineer** in writing if any **Other Contractor** on this **Project** is failing to coordinate its work with the **Work** of this **Contract**. If the **Engineer** finds such charges to be true, the **Engineer** shall promptly issue such directions to the **Other Contractor** with respect thereto as the situation may require. The **City** shall not, however, be liable for any damages suffered by any **Other Contractor's** failure to coordinate its work with the **Work** of this **Contract** or by reason of the **Other Contractor's** failure to promptly comply with the directions so issued by the **Engineer**, or by reason of any **Other Contractor's** default in performance, it being understood that the **City** does not guarantee the responsibility or continued efficiency of any contractor. The **Contractor** agrees to make no claim against

the City for any damages relating to or arising out of any directions issued by the **Engineer** pursuant to this Article 12 (including but not limited to the failure of any **Other Contractor** to comply or promptly comply with such directions), or the failure of the **Engineer** to issue any directions, or the failure of any **Other Contractor** to coordinate its work, or the default in performance of any **Other Contractor**.

12.4 The **Contractor** shall indemnify and hold the City harmless from any and all claims or judgments for damages and from costs and expenses to which the City may be subjected or which it may suffer or incur by reason of the **Contractor's** failure to comply with the **Engineer's** directions promptly; and the **Comptroller** shall have the right to exercise the powers reserved in Article 23 with respect to any claims which may be made for damages due to the **Contractor's** failure to comply with the **Engineer's** directions promptly. Insofar as the facts and Law relating to any claim would preclude the City from being completely indemnified by the **Contractor**, the City shall be partially indemnified by the **Contractor** to the fullest extent provided by Law.

12.5 Should the **Contractor** sustain any damage through any act or omission of any **Other Contractor** having a contract with the City for the performance of work upon the Site or of work which may be necessary to be performed for the proper prosecution of the **Work** to be performed hereunder, or through any act or omission of a subcontractor of such **Other Contractor**, the **Contractor** shall have no claim against the City for such damage, but shall have a right to recover such damage from the **Other Contractor** under the provision similar to the following provisions which apply to this **Contract** and have been or will be inserted in the contracts with such **Other Contractors**:

12.5.1 Should any **Other Contractor** having or who shall hereafter have a contract with the City for the performance of work upon the Site sustain any damage through any act or omission of the **Contractor** hereunder or through any act or omission of any **Subcontractor** of the **Contractor**, the **Contractor** agrees to reimburse such **Other Contractor** for all such damages and to defend at its own expense any action based upon such claim and if any judgment or claim (even if the allegations of the action are without merit) against the City shall be allowed the **Contractor** shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and agrees to indemnify and hold the City harmless from all such claims. Insofar as the facts and Law relating to any claim would preclude the City from being completely indemnified by the **Contractor**, the City shall be partially indemnified by the **Contractor** to the fullest extent provided by Law.

12.6 The City's right to indemnification hereunder shall in no way be diminished, waived or discharged by its recourse to assessment of liquidated damages as provided in Article 15, or by the exercise of any other remedy provided for by **Contract** or by Law.

ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE

13.1 If performance by the **Contractor** is delayed for a reason set forth in Article 13.3, the **Contractor** may be allowed a reasonable extension of time in conformance with this Article 13 and the PPB Rules.

13.2 Any extension of time may be granted only by the ACCO or by the Board for the Extension of Time (hereafter "Board") (as set forth below) upon written application by the **Contractor**.

13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

13.3.1 By the acts or omissions of the City, its officials, agents or employees; or

13.3.2 By the act or omissions of **Other Contractors** on this **Project**; or

13.3.3 By supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, acts of God or the public enemy, excessive inclement weather, war or other national emergency making performance temporarily impossible or illegal, or strikes or labor disputes not brought about by any act or omission of the **Contractor**).

13.3.4 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10.

13.4 The **Contractor** shall not be entitled to receive a separate extension of time for each of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the **Work** as determined by the **ACCO** or the Board, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the **Contractor** or of its **Subcontractors** or **Materialmen**, and would of itself (irrespective of the concurrent causes) have delayed the **Work**, no extension of time will be allowed for the period of delay resulting from such act, fault or omission.

13.5 The determination made by the **ACCO** or the Board on an application for an extension of time shall be binding and conclusive on the **Contractor**.

13.6 The **ACCO** or the Board acting entirely within their discretion may grant an application for an extension of time for causes of delay other than those herein referred.

13.7 Permitting the **Contractor** to continue with the **Work** after the time fixed for its completion has expired, or after the time to which such completion may have been extended has expired, or the making of any payment to the **Contractor** after such time, shall in no way operate as a waiver on the part of the **City** of any of its rights under this **Contract**.

13.8 Application for Extension of Time:

13.8.1 Before the **Contractor's** time extension request will be considered, the **Contractor** shall notify the **ACCO** of the condition which allegedly has caused or is causing the delay, and shall submit a written application to the **ACCO** identifying:

13.8.1(a) The **Contractor**; the registration number; and **Project** description;

13.8.1(b) Liquidated damage assessment rate, as specified in the **Contract**;

13.8.1(c) Original total bid price;

13.8.1(d) The original **Contract** start date and completion date;

13.8.1(e) Any previous time extensions granted (number and duration); and

13.8.1(f) The extension of time requested.

13.8.2 In addition, the application for extension of time shall set forth in detail:

13.8.2(a) The nature of each alleged cause of delay in completing the **Work**;

13.8.2(b) The date upon which each such cause of delay began and ended and the number of **Days** attributable to each such cause;

13.8.2(c) A statement that the **Contractor** waives all claims except for those delineated in the application, and the particulars of any claims which the **Contractor** does not agree to waive. For time extensions for **Substantial Completion** and final completion payments, the application shall include a detailed statement of the dollar amounts of each element of claim item reserved; and

13.8.2(d) A statement indicating the **Contractor's** understanding that the time extension is granted only for purposes of permitting continuation of **Contract** performance and payment for **Work** performed and that the **City** retains its right to conduct an investigation and assess liquidated damages as appropriate in the future.

13.9 Analysis and Approval of Time Extensions:

13.9.1 For time extensions for partial payments, a written determination shall be made by the **ACCO** who may, for good and sufficient cause, extend the time for the performance of the **Contract** as follows:

13.9.1(a) If the **Work** is to be completed within six (6) months, the time for performance may be extended for sixty (60) **Days**;

13.9.1(b) If the **Work** is to be completed within less than one (1) year but more than six (6) months, an extension of ninety (90) **Days** may be granted;

13.9.1(c) If the **Contract** period exceeds one (1) year, besides the extension granted in Article 13.9.1(b), an additional thirty (30) **Days** may be granted for each multiple of six (6) months involved beyond the one (1) year period; or

13.9.1(d) If exceptional circumstances exist, the **ACCO** may extend the time for performance beyond the extensions in Articles 13.9.1(a), 13.9.1(b), and 13.9.1(c). In that event, the **ACCO** shall file with the Mayor's Office of Contract Services a written explanation of the exceptional circumstances.

13.9.2 For extensions of time for **Substantial Completion** and final completion payments, the **Engineer**, in consultation with the **ACCO**, shall prepare a written analysis of the delay (including a preliminary determination of the causes of delay, the beginning and end dates for each such cause of delay, and whether the delays are excusable under the terms of this **Contract**). The report shall be subject to review by and approval of the Board, which shall have authority to question its analysis and determinations and request additional facts or documentation. The report as reviewed and made final by the Board shall be made a part of the **Agency** contract file. Neither the report itself nor anything contained therein shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

13.9.3 Approval Mechanism for Time Extensions for **Substantial Completion** or Final Completion Payments: An extension shall be granted only with the approval of the Board which is comprised of the **ACCO** of the **Agency**, the **City** Corporation Counsel, and the **Comptroller**, or their authorized representatives.

13.9.4 Neither the granting of any application for an extension of time to the **Contractor** or any **Other Contractor** on this **Project** nor the papers, records or reports related to any application for or grant of an extension of time or determination related thereto shall be referred to or offered in evidence by the **Contractor** or its attorneys in any action or proceeding.

13.10 No Damage for Delay: The **Contractor** agrees to make no claim for damages for delay in the performance of this **Contract** occasioned by any act or omission to act of the **City** or any of its representatives, except as provided for in Article 11.

ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK

14.1 Date for **Substantial Completion**: The **Contractor** shall substantially complete the **Work** within the time fixed in Schedule A of the General Conditions, or within the time to which such **Substantial Completion** may be extended.

14.2 Determining the Date of **Substantial Completion**: The **Work** will be deemed to be substantially complete when the two conditions set forth below have been met.

14.2.1 Inspection: The **Engineer** has inspected the **Work** and has made a written determination that it is substantially complete.

14.2.2 Approval of **Final Approved Punch List** and Date for **Final Acceptance**: Following inspection of the **Work**, the **Engineer** shall furnish the **Contractor** with a final punch list, specifying all items of **Work** to be completed and proposing dates for the completion of each specified item of **Work**. The **Contractor** shall then submit in writing to the **Engineer** within ten (10) **Days** of the **Engineer** furnishing the final punch list either acceptance of the dates or proposed alternative dates for the completion of each specified item of **Work**. If the **Contractor** proposes alternative dates, then, 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, the **Engineer** shall establish dates for the completion of each item of **Work**. If the **Contractor** neither accepts the dates nor proposes alternative dates within ten (10) **Days**, the schedule proposed by the **Engineer** shall be deemed accepted. The latest completion date specified shall be the date for **Final Acceptance** of the **Work**.

14.3 Date of **Substantial Completion**. The date of approval of the **Final Approved Punch List**, shall be the date of **Substantial Completion**. The date of approval of the **Final Approved Punch List** shall be either (a) if the **Contractor** approves the final punch list and proposed dates for completion furnished by the **Engineer**, the date of the **Contractor's** approval; or (b) if the **Contractor** neither accepts the dates nor proposes alternative dates, ten (10) **Days** after the **Engineer** furnishes the **Contractor** with a final punch list and proposed dates for completion; or (c) if the **Contractor** proposes alternative dates, the date that the **Engineer** sends written notification to the **Contractor** either approving the **Contractor's** proposed alternative dates or establishing dates for the completion for each item of **Work**.

14.4 Determining the Date of **Final Acceptance**: The **Work** will be accepted as final and complete as of the date of the **Engineer's** 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**.

14.5 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.

14.6 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.

14.7 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 substantially complete the **Work** within the time fixed for such **Substantial Completion** in Schedule A of the General Conditions, plus authorized time extensions, or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the sum fixed in Schedule A of the General Conditions, for each and every Day that the time consumed in substantially completing the **Work** exceeds the time allowed therefor; which said sum, in view of the difficulty of accurately ascertaining the loss which the **City** will suffer by reason of delay in the **Substantial Completion** of the **Work** hereunder, is hereby fixed and agreed as the liquidated damages that the **City** will suffer by reason of such delay, and not as a penalty. This Article 15 shall also apply to the **Contractor** whether or not the **Contractor** is defaulted pursuant to Chapter X of this **Contract**. Neither the failure to assess liquidated damages nor the granting of any time extension shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

15.2 Liquidated damages received hereunder are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the **City's** right to indemnification, or the **Contractor's** obligation to indemnify the **City**, or to any other remedy provided for in this **Contract** or by **Law**.

15.3 The **Commissioner** may deduct and retain out of the monies which may become due hereunder, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the **City**, the **Contractor** shall be liable to pay the difference.

ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION

16.1 Unless otherwise provided for in the **Specifications**, the **Commissioner** may take over, use, occupy or operate any part of the **Work** at any time prior to **Final Acceptance**, upon written notification to the **Contractor**. The **Engineer** shall inspect the part of the **Work** to be taken over, used, occupied, or operated, and will furnish the **Contractor** with a written statement of the **Work**, if any, which remains to be performed on such part. The **Contractor** shall not object to, nor interfere with, the **Commissioner's** decision to exercise the rights granted by Article 16. In the event the **Commissioner** takes over, uses, occupies, or operates any part of the **Work**:

16.1.1 the **Engineer** shall issue a written determination of **Substantial Completion** with respect to such part of the **Work**;

16.1.2 the **Contractor** shall be relieved of its absolute obligation to protect such part of the unfinished **Work** in accordance with Article 7;

16.1.3 the **Contractor's** guarantee on such part of the **Work** shall begin on the date of such use by the City; and;

16.1.4 the **Contractor** shall be entitled to a return of so much of the amount retained in accordance with Article 21 as it relates to such part of the **Work**, except so much thereof as may be retained under Articles 24 and 44.

CHAPTER IV SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17. SUBCONTRACTS

17.1 The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price fixed in Schedule A of the General Conditions, without prior written permission from the **Commissioner**. All subcontracts made by the **Contractor** shall be in writing. No **Work** may be performed by a **Subcontractor** prior to the **Contractor** entering into a written subcontract with the **Subcontractor** and complying with the provisions of this Article 17.

17.2 Before making any subcontracts, the **Contractor** shall submit a written statement to the **Commissioner** giving the name and address of the proposed **Subcontractor**; the portion of the **Work** and materials which it is to perform and furnish; the cost of the subcontract; the VENDEX questionnaire if required; the proposed subcontract if requested by the **Commissioner**; and any other information tending to prove that the proposed **Subcontractor** has the necessary facilities, skill, integrity, past experience, and financial resources to perform the **Work** in accordance with the terms and conditions of this **Contract**.

17.3 In addition to the requirements in Article 17.2, **Contractor** is required to list the **Subcontractor** in the web based Subcontractor Reporting System through the City's Payee Information Portal (PIP), available at www.nyc.gov/pip.¹ For each **Subcontractor** listed, **Contractor** is required to provide the following information: maximum contract value, description of **Subcontractor's** Work, start and end date of the subcontract and identification of the **Subcontractor's** industry. Thereafter, **Contractor** will be required to report in the system the payments made to each **Subcontractor** within 30 days of making the payment. If any of the required information changes throughout the Term of the **Contract**, **Contractor** will be required to revise the information in the system.

Failure of the **Contractor** to list a **Subcontractor** and/or to report **Subcontractor** payments in a timely fashion may result in the **Commissioner** declaring the **Contractor** in default of the **Contract** and will subject **Contractor** to liquidated damages in the amount of \$100 per day for each day that the **Contractor** fails to identify a **Subcontractor** along with the required information about the **Subcontractor** and/or fails to report payments to a **Subcontractor**, beyond the time frames set forth herein or in the notice from the City. Article 15 shall govern the issue of liquidated damages.

¹ In order to use the new system, a PIP account will be required. Detailed instructions on creating a PIP account and using the new system are also available at www.nyc.gov/pip. Additional assistance with PIP may be obtained by emailing the Financial Information Services Agency Help Desk at pip@fisa.nyc.gov.

17.4 If an approved **Subcontractor** elects to subcontract any portion of its subcontract, the proposed sub-subcontract shall be submitted in the same manner as directed above.

17.5 The **Commissioner** will notify the **Contractor** in writing whether the proposed **Subcontractor** is approved. If the proposed **Subcontractor** is not approved, the **Contractor** may submit another proposed **Subcontractor** unless the **Contractor** decides to do the **Work**. No **Subcontractor** shall be permitted to enter or perform any work on the **Site** unless approved.

17.6 Before entering into any subcontract hereunder, the **Contractor** shall provide the proposed **Subcontractor** with a complete copy of this document and inform the proposed **Subcontractor** fully and completely of all provisions and requirements of this **Contract** relating either directly or indirectly to the **Work** to be performed and the materials to be furnished under such subcontract, and every such **Subcontractor** shall expressly stipulate that all labor performed and materials furnished by the **Subcontractor** shall strictly comply with the requirements of this **Contract**.

17.7 Documents given to a prospective **Subcontractor** for the purpose of soliciting the **Subcontractor's** bid shall include either a copy of the bid cover or a separate information sheet setting forth the **Project** name, the **Contract** number (if available), the **Agency** (as noted in Article 2.1.6), and the **Project's** location.

17.8 The **Commissioner's** approval of a **Subcontractor** shall not relieve the **Contractor** of any of its responsibilities, duties, and liabilities hereunder. The **Contractor** shall be solely responsible to the **City** for the acts or defaults of its **Subcontractor** and of such **Subcontractor's** officers, agents, and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the **Contractor** to the extent of its subcontract.

17.9 If the **Subcontractor** fails to maintain the necessary facilities, skill, integrity, past experience, and financial resources (other than due to the **Contractor's** failure to make payments where required) to perform the **Work** in accordance with the terms and conditions of this **Contract**, the **Contractor** shall promptly notify the **Commissioner** and replace such **Subcontractor** with a newly approved **Subcontractor** in accordance with this Article 17.

17.10 The **Contractor** shall be responsible for ensuring that all **Subcontractors** performing **Work** at the **Site** maintain all insurance required by **Law**.

17.11 The **Contractor** shall promptly, upon request, file with the **Engineer** a conformed copy of the subcontract and its cost. The subcontract shall provide the following:

17.11.1 **Payment to Subcontractors:** The agreement between the **Contractor** and its **Subcontractor** shall contain the same terms and conditions as to method of payment for **Work**, labor, and materials, and as to retained percentages, as are contained in this **Contract**.

17.11.2 **Prevailing Rate of Wages:** The agreement between the **Contractor** and its **Subcontractor** shall include the prevailing wage rates and supplemental benefits to be paid in accordance with Labor Law Section 220.

17.11.3 **Section 6-123 of the Administrative Code:** Pursuant to the requirements of Section 6-123 of the Administrative Code, every agreement between the **Contractor** and a **Subcontractor** in excess of fifty thousand (\$50,000) dollars shall include a provision that the **Subcontractor** shall not engage in any unlawful discriminatory practice as defined in Title VIII of the Administrative Code (Section 8-101 *et seq.*).

17.11.4 All requirements required pursuant to federal and/or state grant agreement(s), if applicable to the **Work**.

17.12 The **Commissioner** may deduct from the amounts certified under this **Contract** to be due to the **Contractor**, the sum or sums due and owing from the **Contractor** to the **Subcontractors** according to the terms of the said subcontracts, and in case of dispute between the **Contractor** and its **Subcontractor**, or **Subcontractors**, as to the amount due and owing, the **Commissioner** may deduct and withhold from the amounts certified under this **Contract** to be due to the **Contractor** such sum or sums as may be claimed by such **Subcontractor**, or **Subcontractors**, in a sworn affidavit, to be due and owing until such time as such claim or claims shall have been finally resolved.

17.13 On contracts where performance bonds and payment bonds are executed, the **Contractor** shall include on each requisition for payment the following data: **Subcontractor's** name, value of the subcontract, total amount previously paid to **Subcontractor** for **Work** previously requisitioned, and the amount, including retainage, to be paid to the **Subcontractor** for **Work** included in the requisition.

17.14 On **Contracts** where performance bonds and payment bonds are not executed, the **Contractor** shall include with each requisition for payment submitted hereunder, a signed statement from each and every **Subcontractor** and/or **Materialman** for whom payment is requested in such requisition. Such signed statement shall be on the letterhead of the **Subcontractor** and/or **Materialman** for whom payment is requested and shall (i) verify that such **Subcontractor** and/or **Materialman** has been paid in full for all **Work** performed and/or material supplied to date, exclusive of any amount retained and any amount included on the current requisition, and (ii) state the total amount of retainage to date, exclusive of any amount retained on the current requisition.

ARTICLE 18. ASSIGNMENTS

18.1 The **Contractor** shall not assign, transfer, convey or otherwise dispose of this **Contract**, or the right to execute it, or the right, title or interest in or to it or any part thereof, or assign, by power of attorney or otherwise any of the monies due or to become due under this **Contract**, unless the previous written consent of the **Commissioner** shall first be obtained thereto, and the giving of any such consent to a particular assignment shall not dispense with the necessity of such consent to any further or other assignments.

18.2 Such assignment, transfer, conveyance or other disposition of this **Contract** shall not be valid until filed in the office of the **Commissioner** and the **Comptroller**, with the written consent of the **Commissioner** endorsed thereon or attached thereto.

18.3 Failure to obtain the previous written consent of the **Commissioner** to such an assignment, transfer, conveyance or other disposition, may result in the revocation and annulment of this **Contract**. The City shall thereupon be relieved and discharged from any further liability to the **Contractor**, its assignees, transferees or sublessees, who shall forfeit and lose all monies therefor earned under the **Contract**, except so much as may be required to pay the **Contractor's** employees.

18.4 The provisions of this clause shall not hinder, prevent, or affect an assignment by the **Contractor** for the benefit of its creditors made pursuant to the **Laws** of the State of New York.

18.5 This **Contract** may be assigned by the City to any corporation, agency or instrumentality having authority to accept such assignment.

CHAPTER V
CONTRACTOR'S SECURITY AND GUARANTEE

ARTICLE 19. SECURITY DEPOSIT

19.1 If performance and payment bonds are required, the **City** shall retain the bid security to ensure that the successful bidder executes the **Contract** and furnishes the required payment and performance security within ten (10) **Days** after notice of the award of the **Contract**. If the successful bidder fails to execute the **Contract** and furnish the required payment and performance security, the **City** shall retain such bid security as set forth in the Information for Bidders. If the successful bidder executes the **Contract** and furnishes the required payment and performance security, the **City** shall return the bid security within a reasonable time after the furnishing of such bonds and execution of the **Contract** by the **City**.

19.2 If performance and payment bonds are not required, the bid security shall be retained by the **City** as security for the **Contractor's** faithful performance of the **Contract**. If partial payments are provided, the bid security will be returned to the **Contractor** after the sum retained under Article 21 equals the amount of the bid security, subject to other provisions of this **Contract**. If partial payments are not provided, the bid security will be released when final payment is certified by the **City** for payment.

19.3 If the **Contractor** is declared in default under Article 48 prior to the return of the deposit, or if any claim is made such as referred to in Article 23, the amount of such deposit, or so much thereof as the **Comptroller** may deem necessary, may be retained and then applied by the **Comptroller**:

19.3.1 To compensate the **City** for any expense, loss or damage suffered or incurred by reason of or resulting from such default, including the cost of re-letting and liquidated damages; or

19.3.2 To indemnify the **City** against any and all claims.

ARTICLE 20. PAYMENT GUARANTEE

20.1 On **Contracts** where one hundred (100%) percent performance bonds and payment bonds are executed, this Article 20 does not apply.

20.2 In the event the terms of this **Contract** do not require the **Contractor** to provide a payment bond or where the **Contract** does not require a payment bond for one hundred (100%) percent of the **Contract** price, the **City** shall, in accordance with the terms of this Article 20, guarantee payment of all lawful claims for:

20.2.1 Wages and compensation for labor performed and/or services rendered; and

20.2.2 Materials, equipment, and supplies provided, whether incorporated into the **Work** or not, when demands have been filed with the **City** as provided hereinafter by any person, firm, or corporation which furnished labor, material, equipment, supplies, or any combination thereof, in connection with the **Work** performed hereunder (hereinafter referred to as the "beneficiary") at the direction of the **City** or the **Contractor**.

20.3 The provisions of Article 20.2 are subject to the following limitations and conditions:

20.3.1 If the **Contractor** provides a payment bond for a value that is less than one hundred (100%) percent of the value of the **Contract Work**, the payment bond provided by the **Contractor** shall be primary (and non-contributing) to the payment guarantee provided under this Article 20.

20.3.2 The guarantee is made for the benefit of all beneficiaries as defined in Article 20.2 provided that those beneficiaries strictly adhere to the terms and conditions of Article 20.3.4 and 20.3.5.

20.3.3 Nothing in this Article 20 shall prevent a beneficiary providing labor, services or material for the **Work** from suing the **Contractor** for any amounts due and owing the beneficiary by the **Contractor**.

20.3.4 Every person who has furnished labor or material, to the **Contractor** or to a **Subcontractor** of the **Contractor**, in the prosecution of the **Work** and who has not been paid in full therefor before the expiration of a period of ninety (90) **Days** after the date on which the last of the labor was performed or material was furnished by him/her for which the claim is made, shall have the right to sue on this payment guarantee in his/her own name for the amount, or the balance thereof, unpaid at the time of commencement of the action; provided, however, that a person having a direct contractual relationship with a **Subcontractor** of the **Contractor** but no contractual relationship express or implied with the **Contractor** shall not have a right of action upon the guarantee unless he/she shall have given written notice to the **Contractor** within one hundred twenty (120) **Days** from the date on which the last of the labor was performed or the last of the material was furnished, for which his/her claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the material was furnished or for whom the labor was performed. The notice shall be served by delivering the same personally to the **Contractor** or by mailing the same by registered mail, postage prepaid, in an envelope addressed to the **Contractor** at any place where it maintains an office or conducts its business; provided, however, that where such notice is actually received by the **Contractor** by other means, such notice shall be deemed sufficient.

20.3.5 Except as provided in Labor Law Section 220-g, no action on this payment guarantee shall be commenced after the expiration of the one-year limitations period set forth in Section 137(4)(b) of the State Finance Law.

20.3.6 The **Contractor** shall promptly forward to the **City** any notice or demand received pursuant to Article 20.3.4. The **Contractor** shall inform the **City** of any defenses to the notice or demand and shall forward to the **City** any documents the **City** requests concerning the notice or demand.

20.3.7 All demands made against the **City** by a beneficiary of this payment guarantee shall be presented to the **Engineer** along with all written documentation concerning the demand which the **Engineer** deems reasonably appropriate or necessary, which may include, but shall not be limited to: the subcontract; any invoices presented to the **Contractor** for payment; the notarized statement of the beneficiary that the demand is due and payable, that a request for payment has been made of the **Contractor** and that the demand has not been paid by the **Contractor** within the time allowed for such payment by the subcontract; and copies of any correspondence between the beneficiary and the **Contractor** concerning such demand. The **City** shall notify the **Contractor** that a demand has been made. The **Contractor** shall inform the **City** of any defenses to the demand and shall forward to the **City** any documents the **City** requests concerning the demand.

20.3.8 The City shall make payment only if, after considering all defenses presented by the Contractor, it determines that the payment is due and owing to the beneficiary making the demand.

20.3.9 No beneficiary shall be entitled to interest from the City, or to any other costs, including, but not limited to, attorneys' fees, except to the extent required by State Finance Law Section 137.

20.4 Upon the receipt by the City of a demand pursuant to this Article 20, the City may withhold from any payment otherwise due and owing to the Contractor under this Contract an amount sufficient to satisfy the demand.

20.4.1 In the event the City determines that the demand is valid, the City shall notify the Contractor of such determination and the amount thereof and direct the Contractor to immediately pay such amount to the beneficiary. In the event the Contractor, within seven (7) Days of receipt of such notification from the City, fails to pay the beneficiary, such failure shall constitute an automatic and irrevocable assignment of payment by the Contractor to the beneficiary for the amount of the demand determined by the City to be valid. The Contractor, without further notification or other process, hereby gives its unconditional consent to such assignment of payment to the beneficiary and authorizes the City, on its behalf, to take all necessary actions to implement such assignment of payment, including without limitation the execution of any instrument or documentation necessary to effectuate such assignment.

20.4.2 In the event that the amount otherwise due and owing to the Contractor by the City is insufficient to satisfy such demand, the City may, at its option, require payment from the Contractor of an amount sufficient to cover such demand and exercise any other right to require or recover payment which the City may have under Law or Contract.

20.4.3 In the event the City determines that the demand is invalid, any amount withheld pending the City's review of such demand shall be paid to the Contractor; provided, however, no lien has been filed. In the event a claim or an action has been filed, the terms and conditions set forth in Article 23 shall apply. In the event a lien has been filed, the parties will be governed by the provisions of the Lien Law of the State of New York.

20.5 The provisions of this Article 20 shall not prevent the City and the Contractor from resolving disputes in accordance with the PPB Rules, where applicable.

20.6 In the event the City determines that the beneficiary is entitled to payment pursuant to this Article 20, such determination and any defenses and counterclaims raised by the Contractor shall be taken into account in evaluating the Contractor's performance.

20.7 Nothing in this Article 20 shall relieve the Contractor of the obligation to pay the claims of all persons with valid and lawful claims against the Contractor relating to the Work.

20.8 The Contractor shall not require any performance, payment or other bonds of any Subcontractor if this Contract does not require such bonds of the Contractor.

20.9 The payment guarantee made pursuant to this Article 20 shall be construed in a manner consistent with Section 137 of the State Finance Law and shall afford to persons furnishing labor or materials to the Contractor or its Subcontractors in the prosecution of the Work under this Contract all of the rights and remedies afforded to such persons by such section, including but not limited to, the right

to commence an action against the City on the payment guarantee provided by this Article 20 within the one-year limitations period set forth in Section 137(4)(b).

ARTICLE 21. RETAINED PERCENTAGE

21.1 If this **Contract** requires one hundred (100%) percent performance and payment security, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.2 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded does not exceed one million (\$1,000,000) dollars, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.3 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded exceeds one million (\$1,000,000) dollars, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, up to ten (10%) percent of the value of **Work** certified for payment in each partial payment voucher. The percentage to be retained is set forth in Schedule A of the General Conditions.

ARTICLE 22. INSURANCE

22.1 Types of Insurance: The **Contractor** shall procure and maintain the following types of insurance if, and as indicated, in Schedule A of the General Conditions (with the minimum limits and special conditions specified in Schedule A). Such insurance shall be maintained from the date the **Contractor** is required to provide Proof of Insurance pursuant to Article 22.3.1 through the date of completion of all required **Work** (including punch list work as certified in writing by the **Resident Engineer**), except for insurance required pursuant to Article 22.1.4, which may terminate upon **Substantial Completion** of the **Contract**. All insurance shall meet the requirements set forth in this Article 22. Wherever this Article requires that insurance coverage be "at least as broad" as a specified form (including all ISO forms), there is no obligation that the form itself be used, provided that the **Contractor** can demonstrate that the alternative form or endorsement contained in its policy provides coverage at least as broad as the specified form.

22.1.1 Commercial General Liability Insurance: The **Contractor** shall provide Commercial General Liability Insurance covering claims for property damage and/or bodily injury, including death, which may arise from any of the operations under this **Contract**. Coverage under this insurance shall be at least as broad as that provided by the latest edition of Insurance Services Office ("ISO") Form CG 0001. Such insurance shall be "occurrence" based rather than "claims-made" and include, without limitation, the following types of coverage: premises operations; products and completed operations; contractual liability (including the tort liability of another assumed in a contract); broad form property damage; independent contractors; explosion, collapse and underground (XCU); construction means and methods; and incidental malpractice. Such insurance shall contain a "per project" aggregate limit, as specified in Schedule A, that applies separately to operations under this **Contract**.

22.1.1(a) Such Commercial General Liability Insurance shall name the City as an Additional Insured. Coverage for the City shall specifically include the City's officials and employees, be at least as broad as the latest edition of ISO Form CG 20 10 and provide completed operations coverage at least as broad as the latest edition of ISO Form CG 20 37.

22.1.1(b) Such Commercial General Liability Insurance shall name all other entities designated as additional insureds in Schedule A but only for claims arising from the Contractor's operations under this Contract, with coverage at least as broad as the latest edition of ISO Form CG 20 26.

22.1.1(c) If the Work requires a permit from the Department of Buildings pursuant to 1 RCNY Section 101-08, at http://www.nyc.gov/html/dob/downloads/rules/1_RCNY_101-08.pdf, the Contractor shall provide Commercial General Liability Insurance with limits of at least those required by 1 RCNY section 101-08. If the Work does not require such a permit, the minimum limits shall be those provided for in Schedule A.

22.1.1(d) If any of the Work includes repair of a waterborne vessel owned by or to be delivered to the City, such Commercial General Liability shall include, or be endorsed to include, Ship Repairer's Legal Liability Coverage to protect against, without limitation, liability arising from navigation of such vessels prior to delivery to and acceptance by the City.

22.1.2 Workers' Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance: The Contractor shall provide, and shall cause its Subcontractors to provide, Workers Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance in accordance with the Laws of the State of New York on behalf of all employees providing services under this Contract (except for those employees, if any, for which the Laws require insurance only pursuant to Article 22.1.3).

22.1.3 United States Longshoremen's and Harbor Workers Act and/or Jones Act Insurance: If specified in Schedule A of the General Conditions or if required by Law, the Contractor shall provide insurance in accordance with the United States Longshoremen's and Harbor Workers Act and/or the Jones Act, on behalf of all qualifying employees providing services under this Contract.

22.1.4 Builders Risk Insurance: If specified in Schedule A of the General Conditions, the Contractor shall provide Builders Risk Insurance on a completed value form for the total value of the Work through Substantial Completion of the Work in its entirety. Such insurance shall be provided on an All Risk basis and include coverage, without limitation, for windstorm (including named windstorm), storm surge, flood and earth movement. Unless waived by the Commissioner, it shall include coverage for ordinance and law, demolition and increased costs of construction, debris removal, pollutant clean up and removal, and expediting costs. Such insurance shall cover, without limitation, (a) all buildings and/or structures involved in the Work, as well as temporary structures at the Site, and (b) any property that is intended to become a permanent part of such building or structure, whether such property is on the Site, in transit or in temporary storage. Policies shall name the Contractor as Named Insured and list the City as both an Additional Insured and a Loss Payee as its interest may appear.

22.1.4(a) Policies of such insurance shall specify that, in the event a loss occurs at an occupied facility, occupancy of such facility is permitted without the consent of the issuing insurance company.

22.1.4(b) Such insurance may be provided through an Installation Floater, at the **Contractor's** option, if it otherwise conforms with the requirements of this Article 22.1.4.

22.1.5 Commercial Automobile Liability Insurance: The **Contractor** shall provide Commercial Automobile Liability Insurance for liability arising out of ownership, maintenance or use of any owned (if any), non-owned and hired vehicles to be used in connection with this **Contract**. Coverage shall be at least as broad as the latest edition of ISO Form CA0001. If vehicles are used for transporting hazardous materials, the Automobile Liability Insurance shall be endorsed to provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90.

22.1.6 Contractors Pollution Liability Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Contractors Pollution Liability Insurance covering bodily injury and property damage. Such insurance shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants (including asbestos), including any loss, cost or expense incurred as a result of any cleanup of pollutants (including asbestos) or in the investigation, settlement or defense of any claim, action, or proceedings arising from the operations under this **Contract**. Such insurance shall be in the **Contractor's** name and list the **City** as an Additional Insured and any other entity specified in Schedule A. Coverage shall include, without limitation, (a) loss of use of damaged property or of property that has not been physically injured, (b) transportation, and (c) non-owned disposal sites.

22.1.6(a) Coverage for the **City** as Additional Insured shall specifically include the **City's** officials and employees and be at least as broad as provided to the **Contractor** for this **Project**.

22.1.6(b) If such insurance is written on a claims-made policy, such policy shall have a retroactive date on or before the effective date of this **Contract**, and continuous coverage shall be maintained, or an extended discovery period exercised, for a period of not less than three (3) years from the time the **Work** under this **Contract** is completed.

22.1.7 Marine Insurance:

22.1.7(a) Marine Protection and Indemnity Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Marine Protection and Indemnity Insurance with coverage at least as broad as Form SP-23. The insurance shall provide coverage for the **Contractor** or **Subcontractor** (whichever is doing this **Work**) and for the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured for bodily injury and property damage arising from marine operations under this **Contract**. Coverage shall include, without limitation, injury or death of crew members (if not fully provided through other insurance), removal of wreck, damage to piers, wharves and other fixed or floating objects and loss of or damage to any other vessel or craft, or to property on such other vessel or craft.

22.1.7(b) **Hull and Machinery Insurance:** If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Hull and Machinery Insurance with coverage for the **Contractor** or **Subcontractor** (whichever is doing this **Work**) and for the **City** (together with its officials and employees) as Additional Insured at least as broad as the latest edition of American Institute Tug Form for all tugs used under this **Contract** and Collision Liability at least as broad as the latest edition of American Institute Hull Clauses.

22.1.7(c) **Marine Pollution Liability Insurance:** If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Marine Pollution Liability Insurance covering itself (or the **Subcontractor** doing such **Work**) as Named Insured and the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured. Coverage shall be at least as broad as that provided by the latest edition of Water Quality Insurance Syndicate Form and include, without limitation, liability arising from the discharge or substantial threat of a discharge of oil, or from the release or threatened release of a hazardous substance including injury to, or economic losses resulting from, the destruction of or damage to real property, personal property or natural resources.

22.1.8 The **Contractor** shall provide such other types of insurance, at such minimum limits and with such conditions, as are specified in Schedule A of the General Conditions.

22.2 **General Requirements for Insurance Coverage and Policies:**

22.2.1 All required insurance policies shall be maintained with companies that may lawfully issue the required policy and have an A.M. Best rating of at least A-/VII or a Standard and Poor's rating of at least A, unless prior written approval is obtained from the **City** Corporation Counsel.

22.2.2 The **Contractor** shall be solely responsible for the payment of all premiums for all required policies and all deductibles and self-insured retentions to which such policies are subject, whether or not the **City** is an insured under the policy.

22.2.3 In his/her sole discretion, the **Commissioner** may, subject to the approval of the **Comptroller** and the **City** Corporation Counsel, accept Letters of Credit and/or custodial accounts in lieu of required insurance.

22.2.4 The **City's** limits of coverage for all types of insurance required pursuant to Schedule A of the General Conditions shall be the greater of (i) the minimum limits set forth in Schedule A or (ii) the limits provided to the **Contractor** as Named Insured under all primary, excess, and umbrella policies of that type of coverage.

22.2.5 The **Contractor** may satisfy its insurance obligations under this Article 22 through primary policies or a combination of primary and excess/umbrella policies, so long as all policies provide the scope of coverage required herein.

22.2.6 Policies of insurance provided pursuant to this Article 22 shall be primary and non-contributing to any insurance or self-insurance maintained by the **City**.

22.3 Proof of Insurance:

22.3.1 For all types of insurance required by Article 22.1 and Schedule A, except for insurance required by Articles 22.1.4 and 22.1.7, the **Contractor** shall file proof of insurance in accordance with this Article 22.3 within ten (10) **Days** of award. For insurance provided pursuant to Articles 22.1.4 and 22.1.7, proof shall be filed by a date specified by the **Commissioner** or ten (10) **Days** prior to the commencement of the portion of the **Work** covered by such policy, whichever is earlier.

22.3.2 For Workers' Compensation Insurance provided pursuant to Article 22.1.2, the **Contractor** shall submit one of the following forms: C-105.2 Certificate of Workers' Compensation Insurance; U-26.3 - State Insurance Fund Certificate of Workers' Compensation Insurance; Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. For Disability Benefits Insurance provided pursuant to Article 22.1.2, the **Contractor** shall submit DB-120.1 - Certificate Of Insurance Coverage Under The NYS Disability Benefits Law, Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. ACORD forms are not acceptable.

22.3.3 For policies provided pursuant to all of Article 22.1 other than Article 22.1.2, the **Contractor** shall submit one or more Certificates of Insurance on forms acceptable to the **Commissioner**. All such Certificates of Insurance shall certify (a) the issuance and effectiveness of such policies of insurance, each with the specified minimum limits (b) for insurance secured pursuant to Article 22.1.1 that the **City** and any other entity specified in Schedule A is an Additional Insured with coverage at least as broad as the most recent edition of ISO Forms CG 20 10, CG 20 37, and CG 20 26, as applicable; (c) in the event insurance is required pursuant to Article 22.1.6 and/or Article 22.1.7, that the **City** is an Additional Insured thereunder; (d) the company code issued to the insurance company by the National Association of Insurance Commissioners (the NAIC number); and (e) the number assigned to the **Contract** by the **City**. All such Certificates of Insurance shall be accompanied by either a duly executed "Certification by Broker" in the form contained in Part III of Schedule A or copies of all policies referenced in such Certificate of Insurance as certified by an authorized representative of the issuing insurance carrier. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

22.3.4 Documentation confirming renewals of insurance shall be submitted to the **Commissioner** prior to the expiration date of coverage of policies required under this **Contract**. Such proofs of insurance shall comply with the requirements of Articles 22.3.2 and 22.3.3.

22.3.5 The **Contractor** shall be obligated to provide the **City** with a copy of any policy of insurance provided pursuant to this Article 22 upon the demand for such policy by the **Commissioner** or the **City** Corporation Counsel.

22.4 Operations of the Contractor:

22.4.1 The **Contractor** shall not commence the **Work** unless and until all required certificates have been submitted to and accepted by the **Commissioner**. Acceptance by the **Commissioner** of a certificate does not excuse the **Contractor** from securing insurance

consistent with all provisions of this Article 22 or of any liability arising from its failure 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.

22.4.4 In the event the **Contractor** receives notice, from an insurance company or other person, that any insurance policy required under this Article 22 shall be cancelled or terminated (or has been cancelled or terminated) for any reason, the **Contractor** shall immediately forward a copy of such notice to both the **Commissioner** and the New York City Comptroller, attn: Office of Contract Administration, Municipal Building, One Centre Street, room 1005, New York, New York 10007. Notwithstanding the foregoing, the **Contractor** shall ensure that there is no interruption in any of the insurance coverage required under this Article 22.

22.4.5 Where notice of loss, damage, occurrence, accident, claim or suit is required under an insurance policy maintained in accordance with this Article 22, the **Contractor** shall notify in writing all insurance carriers that issued potentially responsive policies of any such event relating to any operations under this **Contract** (including notice to Commercial General Liability insurance carriers for events relating to the **Contractor's** own employees) no later than 20 days after such event. For any policy where the City is an Additional Insured, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Insured as well as the Named Insured." Such notice shall also contain the following information: the number of the insurance policy, the name of the named insured, the date and location of the damage, occurrence, or accident, and the identity of the persons or things injured, damaged or lost. The **Contractor** shall simultaneously send a copy of such notice to the City of New York c/o Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

22.4.6 In the event of any loss, accident, claim, action, or other event that does or can give rise to a claim under any insurance policy required under this Article 22, the **Contractor** shall at all times fully cooperate with the City with regard to such potential or actual claim.

22.5 **Subcontractor Insurance:** In the event the **Contractor** requires any **Subcontractor** to procure insurance with regard to any operations under this **Contract** and requires such **Subcontractor** to name the **Contractor** as an **Additional Insured** thereunder, the **Contractor** shall ensure that the **Subcontractor** name the City, including its officials and employees, as an **Additional Insured** with coverage at least as broad as the most recent edition of ISO Form CG 20 26.

22.6 Wherever reference is made in Article 7 or this Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth in Schedule A of the General Conditions. In the event no address is set forth in Schedule A, such documents are to be sent to the **Commissioner's** address as provided elsewhere in this **Contract**.

22.7 Apart from damages or losses covered by insurance provided pursuant to Articles 22.1.2, 22.1.3, or 22.1.5, the **Contractor** waives all rights against the **City**, including its officials and employees, for any damages or losses that are covered under any insurance required under this Article 22 (whether or not such insurance is actually procured or claims are paid thereunder) or any other insurance applicable to the operations of the **Contractor** and/or its employees, agents, or **Subcontractors**.

22.8 In the event the **Contractor** utilizes a self-insurance program to satisfy any of the requirements of this Article 22, the **Contractor** shall ensure that any such self-insurance program provides the **City** with all rights that would be provided by traditional insurance under this Article 22, including but not limited to the defense and indemnification obligations that insurers are required to undertake in liability policies.

22.9 Materiality/Non-Waiver: The **Contractor's** failure to secure policies in complete conformity with this Article 22, or to give an insurance company timely notice of any sort required in this **Contract** or to do anything else required by this Article 22 shall constitute a material breach of this **Contract**. Such breach shall not be waived or otherwise excused by any action or inaction by the **City** at any time.

22.10 Pursuant to General Municipal Law Section 108, this **Contract** shall be void and of no effect unless **Contractor** maintains Workers' Compensation Insurance for the term of this **Contract** to the extent required and in compliance with the New York State Workers' Compensation Law.

22.11 Other Remedies: Insurance coverage provided pursuant to this Article 22 or otherwise shall not relieve the **Contractor** of any liability under this **Contract**, nor shall it preclude the **City** from exercising any rights or taking such other actions available to it under any other provisions of this **Contract** or Law.

ARTICLE 23. MONEY RETAINED AGAINST CLAIMS

23.1 If any claim shall be made by any person or entity (including **Other Contractors** with the **City** on this **Project**) against the **City** or against the **Contractor** and the **City** for any of the following:

(a) An alleged loss, damage, injury, theft or vandalism of any of the kinds referred to in Articles 7 and 12, plus the reasonable costs of defending the **City**, which in the opinion of the **Comptroller** may not be paid by an insurance company (for any reason whatsoever); or

(b) An infringement of copyrights, patents or use of patented articles, tools, etc., 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 23, and return the balance, if any, without interest, to the **Contractor**.

ARTICLE 24. MAINTENANCE AND GUARANTY

24.1 The **Contractor** shall promptly repair, replace, restore or rebuild, as the **Commissioner** may determine, any finished **Work** in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of **Substantial Completion** (or use and occupancy in accordance with Article 16), except where other periods of maintenance and guaranty are provided for in Schedule A.

24.2 As security for the faithful performance of its obligations hereunder, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to one (1%) percent of the price (or the amount fixed in Schedule A of the General Conditions) in cash or certified check upon a state or national bank and trust company or a check of such bank and trust company signed by a duly authorized officer thereof and drawn to the order of the **Comptroller**, or obligations of the **City**, which the **Comptroller** may approve as of equal value with the sum so required.

24.3 In lieu of the above, the **Contractor** may make such security payment to the **City** 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 of such equipment and materials or lessees of the premises into which the equipment and materials have been installed.

CHAPTER VI
CHANGES, EXTRA WORK, AND DOCUMENTATION OF CLAIM

ARTICLE 25. CHANGES

25.1 Changes may be made to this **Contract** only as duly authorized in writing by the **Commissioner** in accordance with the **Law** and this **Contract**. All such changes, modifications, and amendments will become a part of the **Contract**. Work so ordered shall be performed by the **Contractor**.

25.2 **Contract** changes will be made only for **Work** necessary to complete the **Work** included 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 **Agency**.

ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK

26.1 **Overrun of Unit Price Item:** An overrun is any quantity of a unit price item which the **Contractor** is directed to provide which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule.

26.1.1 For any unit price item, the **Contractor** will be paid at the unit price bid for any quantity up to one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule. If during the progress of the **Work**, the actual quantity of any unit price item required to complete the **Work** approaches the estimated quantity 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 the basis of time and material records for the actual and reasonable cost as determined under Article 26.2, but in no event at a unit price exceeding the unit price bid.

26.2 Extra Work: For **Extra Work** where payment is by agreement on a fixed price in accordance with Article 25.3.2, the price to be paid for such **Extra Work** shall be based on the fair and reasonable estimated cost of the items set forth below. For **Extra Work** where payment is based on time and material records in accordance with Article 25.3.3, the price to be paid for such **Extra Work** shall be the actual and reasonable cost of the items set forth below, calculated in accordance with the formula specified therein, if any.

- 26.2.1 Necessary materials (including transportation to the Site); plus
- 26.2.2 Necessary direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits; plus
- 26.2.3 Sales and personal property taxes, if any, required to be paid on materials not incorporated into such **Extra Work**; plus
- 26.2.4 Reasonable rental value of **Contractor-owned** (or **Subcontractor-owned**, as applicable), necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per operating hour: $(.035) \times (\text{HP rating}) \times (\text{Fuel cost/gallon})$. 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 Equipment Watch (the "Green Book"), or seventy-five percent of the monthly prorated rental rates established in the "Rental Rate Blue Book for Construction Equipment" published by Equipment Watch (the "Blue Book") (the applicable Blue Book rate being for rental only without the addition of any operational costs listed in the Blue Book). The reasonable rental value is deemed to be inclusive of all operating costs except for fuel/energy consumption and equipment operator's wages/costs. For multiple shift utilization, reimbursement shall be calculated as follows: first shift shall be seventy-five (75%) percent of such rental rates; second shift shall be sixty (60%) percent of the first shift rate; and third shift shall be forty (40%) percent of the first shift rate. Equipment on standby shall be reimbursed at one-third (1/3) the prorated monthly rental rate. **Contractor-owned** (or **Subcontractor-owned**, as applicable) equipment includes equipment from rental companies affiliated with or controlled by the **Contractor** (or **Subcontractor**, as applicable), as determined by the **Commissioner**. In establishing cost reimbursement for non-operating **Contractor-owned** (or **Subcontractor-owned**, as applicable) equipment (scaffolding, sheeting systems, road plates, etc.), the City may restrict reimbursement to a purchase-salvage/life cycle basis if less than the computed rental costs; plus
- 26.2.5 Necessary installation and dismantling of such plant and equipment, including transportation to and from the Site, if any, provided that, in the case of non-**Contractor-owned** (or non-**Subcontractor-owned**, as applicable) equipment rented from a third party, the cost of installation and dismantling are not allowable if such costs are included in the rental rate; plus
- 26.2.6 Necessary fees charged by governmental entities; plus

26.2.7 Necessary construction-related service fees charged by non-governmental entities, such as landfill tipping fees; plus

26.2.8 Reasonable rental costs of non-Contractor-owned (or non-Subcontractor-owned, as applicable) necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per hour of operation: $(.035) \times (\text{HP rating}) \times (\text{Fuel cost/gallon})$. 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

26.2.9 Workers' Compensation Insurance, and any insurance coverage expressly required by the City for the performance of the **Extra Work** which is different than the types of insurance required by Article 22 and Schedule A of the General Conditions. The cost of Workers' Compensation Insurance is subject to applicable payroll limitation caps and shall be based upon the carrier's Manual Rate for such insurance derived from the applicable class Loss Cost ("LC") and carrier's Lost Cost Multiplier ("LCM") approved by the New York State Department of Financial Services, and with the exception of experience rating, rate modifiers as promulgated by the New York Compensation Insurance Rating Board ("NYCIRB"); plus

26.2.10 Additional costs incurred as a result of the **Extra Work** for performance and payment bonds; plus

26.2.11 Twelve percent (12%) percent of the total of items in Articles 26.2.1 through 26.2.5 as compensation for overhead, except that no percentage for overhead will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes. Overhead shall include without limitation, all costs and expenses in connection with administration, management superintendence, small tools, and insurance required by Schedule A of the General Conditions other than Workers' Compensation Insurance; plus

26.2.12 Ten (10%) percent of the total of items in Articles 26.2.1 through 26.2.5, plus the items in Article 26.2.11, as compensation for profit, except that no percentage for profit will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes; plus

26.2.13 Five (5%) percent of the total of items in Articles 26.2.6 through 26.2.10 as compensation for overhead and profit.

26.3 Where the **Extra Work** is performed in whole or in part by other than the Contractor's own forces pursuant to Article 26.2, the Contractor shall be paid, subject to pre-audit by the **Engineering Audit Officer**, the cost of such **Work** computed in accordance with Article 26.2 above, plus an additional allowance of five (5%) percent to cover the Contractor's overhead and profit.

26.4 Where a change is ordered, involving both **Extra Work** and omitted or reduced **Contract Work**, the **Contract** price shall be adjusted, subject to pre-audit by the **EAO**, in an amount based on the difference between the cost of such **Extra Work** and of the omitted or reduced **Work**.

26.5 Where the Contractor and the Commissioner can agree upon a fixed price for **Extra Work** in accordance with Article 25.3.2 or another method of payment for **Extra Work** in accordance with Article

25.3.4, or for **Extra Work** ordered in connection with omitted **Work**, such method, subject to pre-audit by the **EAO**, may, at the option of the **Commissioner**, be substituted for the cost plus a percentage method provided in Article 26.2; provided, however, that if the **Extra Work** is performed by a **Subcontractor**, the **Contractor** shall not be entitled to receive more than an additional allowance of five (5%) percent for overhead and profit over the cost of such **Subcontractor's Work** as computed in accordance with Article 26.2.

ARTICLE 27. RESOLUTION OF DISPUTES

27.1 All disputes between the **City** and the **Contractor** of the kind delineated in this Article 27.1 that arise under, or by virtue of, this **Contract** shall be finally resolved in accordance with the provisions of this Article 27 and the **PPB Rules**. This procedure for resolving all disputes of the kind delineated herein shall be the exclusive means of resolving any such disputes.

27.1.1 This Article 27 shall not apply to disputes concerning matters dealt with in other sections of the **PPB Rules**, or to disputes involving patents, copyrights, trademarks, or trade secrets (as interpreted by the courts of New York State) relating to proprietary rights in computer software.

27.1.2 This Article 27 shall apply only to disputes about the scope of **Work** delineated by the **Contract**, the interpretation of **Contract** documents, the amount to be paid for **Extra Work** or disputed work performed in connection with the **Contract**, the conformity of the **Contractor's Work** to the **Contract**, and the acceptability and quality of the **Contractor's Work**; such disputes arise when the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** makes a determination with which the **Contractor** disagrees.

27.2 All determinations required by this Article 27 shall be made in writing clearly stated, with a reasoned explanation for the determination based on the information and evidence presented to the party making the determination. Failure to make such determination within the time required by this Article 27 shall be deemed a non-determination without prejudice that will allow application to the next level.

27.3 During such time as any dispute is being presented, heard, and considered pursuant to this Article 27, the **Contract** terms shall remain in force and the **Contractor** shall continue to perform **Work** as directed by the **ACCO** or the **Engineer**. Failure of the **Contractor** to continue **Work** as directed shall constitute a waiver by the **Contractor** of its claim.

27.4. Presentation of Disputes to Commissioner.

Notice of Dispute and Agency Response. The **Contractor** shall present its dispute in writing ("Notice of Dispute") to the **Commissioner** within thirty (30) Days of receiving written notice of the determination or action that is the subject of the dispute. This notice requirement shall not be read to replace any other notice requirements contained in the **Contract**. The Notice of Dispute shall include all the facts, evidence, documents, or other basis upon which the **Contractor** relies in support of its position, as well as a detailed computation demonstrating how any amount of money claimed by the **Contractor** 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 dispute presented, whether or not the **Commissioner** participated therein. The **Commissioner** may or, at the request of any party to the dispute, shall compel the participation of any **Other Contractor** with a contract related to the **Work** of this **Contract**, and that **Contractor** shall be bound by the decision of the **Commissioner**. Any **Other Contractor** thus brought into the dispute resolution proceeding shall have the same rights and obligations under this Article 27 as the **Contractor** initiating the dispute.

27.4.2 Commissioner Determination. Within thirty (30) **Days** after the receipt of all materials and information, or such longer time as may be agreed to by the parties, the **Commissioner** shall make his or her determination and shall deliver or send a copy of such determination to the **Contractor**, the **ACCO**, and **Engineer, Resident Engineer, Engineering Audit Officer**, or other designee of the **Commissioner**, as applicable, together with a statement concerning how the decision may be appealed.

27.4.3 Finality of Commissioner's Decision. The **Commissioner's** decision shall be final and binding on all parties, unless presented to the Contract Dispute Resolution Board pursuant to this Article 27. The **City** may not take a petition to the Contract Dispute Resolution Board. However, should the **Contractor** take such a petition, the **City** may seek, and the Contract Dispute Resolution Board may render, a determination less favorable to the **Contractor** and more favorable to the **City** than the decision of the **Commissioner**.

27.5 Presentation of Dispute to the Comptroller. Before any dispute may be brought by the **Contractor** to the Contract Dispute Resolution Board, the **Contractor** must first present its claim to the **Comptroller** for his or her review, investigation, and possible adjustment.

27.5.1 Time, Form, and Content of Notice. Within thirty (30) **Days** of its receipt of a decision by the **Commissioner**, the **Contractor** shall submit to the **Comptroller** and to the **Commissioner** a Notice of Claim regarding its dispute with the **Agency**. The Notice of Claim shall consist of (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written decision of the **Commissioner**; and (iii) a copy of all materials submitted by the **Contractor** to the **Agency**, including the Notice of Dispute. The **Contractor** may not present to the **Comptroller** any material not presented to the **Commissioner**, except at the request of the **Comptroller**.

27.5.2 Response. Within thirty (30) **Days** of receipt of the Notice of Claim, the **Agency** shall make available to the **Comptroller** a copy of all material submitted by the **Agency** to the **Commissioner** in connection with the dispute. The **Agency** may not present to the

Comptroller any material not presented to the **Commissioner** except at the request of the **Comptroller**.

27.5.3 Comptroller Investigation. The **Comptroller** may investigate the claim in dispute and, in the course of such investigation, may exercise all powers provided in Sections 7-201 and 7-203 of the Administrative Code. In addition, the **Comptroller** may demand of either party, and such party shall provide, whatever additional material the **Comptroller** deems pertinent to the claim, including original business records of the **Contractor**. Willful failure of the **Contractor** to produce within fifteen (15) Days any material requested by the **Comptroller** shall constitute a waiver by the **Contractor** of its claim. The **Comptroller** may also schedule an informal conference to be attended by the **Contractor**, **Agency** representatives, and any other personnel desired by the **Comptroller**.

27.5.4 Opportunity of Comptroller to Compromise or Adjust Claim. The **Comptroller** shall have forty-five (45) Days from his or her receipt of all materials referred to in Article 27.5.3 to investigate the disputed claim. The period for investigation and compromise may be further extended by agreement between the **Contractor** and the **Comptroller**, to a maximum of ninety (90) Days from the **Comptroller's** receipt of all materials. The **Contractor** may not present its petition to the Contract Dispute Resolution Board until the period for investigation and compromise delineated in this Article 27.5.4 has expired. In compromising or adjusting any claim hereunder, the **Comptroller** may not revise or disregard the terms of the **Contract** between the parties.

27.6 Contract Dispute Resolution Board. There shall be a Contract Dispute Resolution Board composed of:

27.6.1 The chief administrative law judge of the Office of Administrative Trials and Hearings (OATH) or his/her designated OATH administrative law judge, who shall act as chairperson, and may adopt operational procedures and issue such orders consistent with this Article 27 as may be necessary in the execution of the Contract Dispute Resolution Board's functions, including, but not limited to, granting extensions of time to present or respond to submissions;

27.6.2 The **CCPO** or his/her designee; any designee shall have the requisite background to consider and resolve the merits of the dispute and shall not have participated personally and substantially in the particular matter that is the subject of the dispute or report to anyone who so participated; and

27.6.3 A person with appropriate expertise who is not an employee of the **City**. This person shall be selected by the presiding administrative law judge from a prequalified panel of individuals, established and administered by OATH with appropriate background to act as decision-makers in a dispute. Such individual may not have a contract or dispute with the **City** or be an officer or employee of any company or organization that does, or regularly represents persons, companies, or organizations having disputes with the **City**.

27.7 Petition to the Contract Dispute Resolution Board. In the event the claim has not been settled or adjusted by the **Comptroller** within the period provided in this Article 27, the **Contractor**, within thirty (30) Days thereafter, may petition the Contract Dispute Resolution Board to review the **Commissioner's** determination.

27.7.1 Form and Content of Petition by Contractor. The **Contractor** shall present its dispute to the Contract Dispute Resolution Board in the form of a petition, which shall

include (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed, and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written Decision of the **Commissioner**, (iii) copies of all materials submitted by the **Contractor** to the Agency; (iv) a copy of the written decision of the **Comptroller**, if any, and (v) copies of all correspondence with, or written material submitted by the **Contractor**, to the **Comptroller**. The **Contractor** shall concurrently submit four (4) complete sets of the Petition: one set to the City Corporation Counsel (Attn: Commercial and Real Estate Litigation Division) and three (3) sets to the Contract Dispute Resolution Board at OATH's offices with proof of service on the City Corporation Counsel. In addition, the **Contractor** shall submit a copy of the written statement of the substance of the dispute, cited in (i) above, to both the **Commissioner** and the **Comptroller**.

27.7.2 Agency Response. Within thirty (30) Days of its receipt of the Petition by the City Corporation Counsel, the **Agency** shall respond to the brief written statement of the **Contractor** and make available to the Contract Dispute Resolution Board all material it submitted to the **Commissioner** and **Comptroller**. Three (3) complete copies of the **Agency** response shall be provided to the Contract Dispute Resolution Board and one to the **Contractor**. Extensions of time for submittal of the **Agency** response shall be given as necessary upon a showing of good cause or, upon consent of the parties, for an initial period of up to thirty (30) Days.

27.7.3 Further Proceedings. The Contract Dispute Resolution Board shall permit the **Contractor** to present its case by submission of memoranda, briefs, and oral argument. The Contract Dispute Resolution Board shall also permit the **Agency** to present its case in response to the **Contractor** by submission of memoranda, briefs, and oral argument. If requested by the City Corporation Counsel, the **Comptroller** shall provide reasonable assistance in the preparation of the **Agency's** case. Neither the **Contractor** nor the **Agency** may support its case with any documentation or other material that was not considered by the **Comptroller**, unless requested by the Contract Dispute Resolution Board. The Contract Dispute Resolution Board, in its discretion, may seek such technical or other expert advice as it shall deem appropriate and may seek, on its own or upon application of a party, any such additional material from any party as it deems fit. The Contract Dispute Resolution Board, in its discretion, may combine more than one dispute between the parties for concurrent resolution.

27.7.4 Contract Dispute Resolution Board Determination. Within forty-five (45) Days of the conclusion of all written submissions and oral arguments, the Contract Dispute Resolution Board shall render a written decision resolving the dispute. In an unusually complex case, the Contract Dispute Resolution Board may render its decision in a longer period, not to exceed ninety (90) Days, and shall so advise the parties at the commencement of this period. The Contract Dispute Resolution Board's decision must be consistent with the terms of the **Contract**. Decisions of the Contract Dispute Resolution Board shall only resolve matters before the Contract Dispute Resolution Board and shall not have precedential effect with respect to matters not before the Contract Dispute Resolution Board.

27.7.5 Notification of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board shall send a copy of its decision to the **Contractor**, the **ACCO**, the Engineer, the **Comptroller**, the City Corporation Counsel, the CCPO, and the **PPB**. A decision in favor of the **Contractor** shall be subject to the prompt payment provisions of the **PPB Rules**. The Required Payment Date shall be thirty (30) Days after the date the parties are formally notified of the Contract Dispute Resolution Board's decision.

27.7.6 Finality of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution

Board's decision shall be final and binding on all parties. Any party may seek review of the Contract Dispute Resolution Board's decision solely in the form of a challenge, filed within four (4) months of the date of the Contract Dispute Resolution Board's decision, in a court of competent jurisdiction of the State of New York, County of New York pursuant to Article 78 of the Civil Practice Law and Rules. Such review by the court shall be limited to the question of whether or not the Contract Dispute Resolution Board's decision was made in violation of lawful procedure, was affected by an error of Law, or was arbitrary and capricious or an abuse of discretion. No evidence or information shall be introduced or relied upon in such proceeding that was not presented to the Contract Dispute Resolution Board in accordance with this Article 27.

27.8 Any termination, cancellation, or alleged breach of the Contract prior to or during the pendency of any proceedings pursuant to this Article 27 shall not affect or impair the ability of the Commissioner or Contract Dispute Resolution Board to make a binding and final decision pursuant to this Article 27.

ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON A TIME & MATERIALS BASIS

28.1 While the Contractor or any of its Subcontractors is performing Work on a time and material basis or Extra Work on a time and material basis ordered by the Commissioner under Article 25, or where the Contractor believes that it or any of its Subcontractors is performing Extra Work but a final determination by Agency has not been made, or the Contractor or any of its Subcontractors is performing disputed Work (whether on or off the Site), or complying with a determination or order under protest in accordance with Articles 11, 27, and 30, in each such case the Contractor shall furnish the Resident Engineer daily with three (3) copies of written statements signed by the Contractor's representative at the Site showing:

28.1.1 The name, trade, and number of each worker employed on such Work or engaged in complying with such determination or order, the number of hours employed, and the character of the Work each is doing; and

28.1.2 The nature and quantity of any materials, plant and equipment furnished or used in connection with the performance of such Work or compliance with such determination or order, and from whom purchased or rented.

28.2 A copy of such statement will be countersigned by the Resident Engineer, noting thereon any items not agreed to or questioned, and will be returned to the Contractor within two (2) Days after submission.

28.3 The Contractor and its Subcontractors, when required by the Commissioner, or the Comptroller, shall also produce for inspection, at the office of the Contractor or Subcontractor, any and all of its books, bid documents, financial statements, vouchers, records, daily job diaries and reports, and cancelled checks, and any other documents relating to showing the nature and quantity of the labor, materials, plant and equipment actually used in the performance of such Work, or in complying with such determination or order, and the amounts expended therefor, and shall permit the Commissioner and the Comptroller to make such extracts therefrom, or copies thereof, as they or either of them may desire.

28.4 In connection with the examination provided for herein, the Commissioner, upon demand therefor, will produce for inspection by the Contractor such records as the Agency may have with

respect to such **Extra Work** or disputed **Work** performed under protest pursuant to order of the **Commissioner**, except those records and reports which may have been prepared for the purpose of determining the accuracy and validity of the **Contractor's** claim.

28.5 Failure to comply strictly with these requirements shall constitute a waiver of any claim for extra compensation or damages on account of the performance of such **Work** or compliance with such determination or order.

ARTICLE 29. OMITTED WORK

29.1 If any **Contract Work** in a lump sum **Contract**, or if any part of a lump sum item in a unit price, lump sum, or percentage-bid **Contract** is omitted by the **Commissioner** pursuant to Article 33, the **Contract** price, subject to audit by the EAO, shall be reduced by a pro rata portion of the lump sum bid amount based upon the percent of **Work** omitted subject to Article 29.4. For the purpose of determining the pro rata portion of the lump sum bid amount, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be the determining factor.

29.2 If the whole of a lump sum item or units of any other item is so omitted by the **Commissioner** in a unit price, lump sum, or percentage-bid **Contract**, then no payment will be made therefor except as provided in Article 29.4.

29.3 For units that have been ordered but are only partially completed, the unit price shall be reduced by a pro rata portion of the unit price bid based upon the percentage of **Work** omitted subject to Article 29.4.

29.4 In the event the **Contractor**, with respect to any omitted **Work**, has purchased any non-cancelable material and/or equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated into the **Work**, the **Contractor** shall be paid for such material and/or equipment in accordance with Article 64.2.1(b); provided, however, such payment is contingent upon the **Contractor's** delivery of such material and/or equipment in acceptable condition to a location designated by the **City**.

29.5 The **Contractor** agrees to make no claim for damages or for loss of overhead and profit with regard to any omitted **Work**.

ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES: PRODUCTION OF FINANCIAL RECORDS

30.1 If the **Contractor** shall claim to be sustaining damages by reason of any act or omission of the **City** or its agents, it shall submit to the **Commissioner** within forty-five (45) **Days** from the time such damages are first incurred, and every thirty (30) **Days** thereafter 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 strictly comply with the foregoing provisions, such claims shall be deemed waived and no right to recover on such claims shall exist. Damages that the **Contractor** may claim in any action or dispute resolution procedure arising under or by reason of this **Contract** shall not be different from or in excess of the statements and documentation made pursuant to this Article 30.

30.2 In addition to the foregoing statements, the **Contractor** shall, upon notice from the **Commissioner**, produce for examination at the **Contractor's** office, by the **Engineer, Architect or Project Manager**, all of its books of account, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**, and submit itself and persons in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.3 In addition to the statements required under Article 28 and this Article 30, the **Contractor** and/or its **Subcontractor** shall, within thirty (30) **Days** upon notice from the **Commissioner** or **Comptroller**, produce for examination at the **Contractor's** and/or **Subcontractor's** office, by a representative of either the **Commissioner** or **Comptroller**, all of its books of account, bid documents, financial statements, accountant workpapers, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**. Further, the **Contractor** and/or its **Subcontractor** shall submit any person in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.4 Unless the information and examination required under Article 30.3 is provided by the **Contractor** and/or its **Subcontractor** upon thirty (30) **Days'** notice from the **Commissioner** or **Comptroller**, or upon the **Commissioner's** or **Comptroller's** written authorization to extend the time to comply, the **City** shall be released from all claims arising under, relating to or by reason of this **Contract**, except for sums certified by the **Commissioner** to be due under the provisions of this **Contract**. It is further stipulated and agreed that no person has the power to waive any of the foregoing provisions and that in any action or dispute resolution procedure against the **City** to recover any sum in excess of the sums certified by the **Commissioner** to be due under or by reason of this **Contract**, the **Contractor** must allege in its complaint and prove, at trial or during such dispute resolution procedure, compliance with the provisions of this Article 30.

30.5 In addition, after the commencement of any action or dispute resolution procedure by the **Contractor** arising under or by reason of this **Contract**, the **City** shall have the right to require the **Contractor** to produce for examination under oath, up until the trial of the action or hearing before the Contract Dispute Resolution Board, the books and documents described in Article 30.3 and submit itself and all persons in its employ for examination under oath. If this Article 30 is not complied with as required, then the **Contractor** hereby consents to the dismissal of the action or dispute 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** pursuant to the provisions of Article 12; or

33.1.3(c) To expedite the completion of the entire **Project** even though the completion of this particular **Contract** may thereby be delayed.

ARTICLE 34. NO ESTOPPEL

34.1 Neither the **City** nor any **Agency**, official, agent or employee thereof, shall be bound, precluded or estopped by any determination, decision, approval, order, letter, payment or certificate made or given under or in connection with this **Contract** by the **City**, the **Commissioner**, the **Engineer**, the **Resident Engineer**, or any other official, agent or employee of the **City**, either before or after the final completion and acceptance of the **Work** and payment therefor:

34.1.1 From showing the true and correct classification, amount, quality or character of the **Work** actually done; or that any such determination, decision, order, letter, payment or certificate was untrue, incorrect or improperly made in any particular, or that the **Work**, or any part thereof, does not in fact conform to the requirements of this **Contract**; and

34.1.2 From demanding and recovering from the **Contractor** any overpayment made to it, or such damages as the **City** may sustain by reason of the **Contractor's** failure to perform each and every part of its **Contract**.

CHAPTER VIII LABOR PROVISIONS

ARTICLE 35. EMPLOYEES

35.1 The **Contractor** and its **Subcontractors** shall not employ on the **Work**:

35.1.1 Anyone who is not competent, faithful and skilled in the **Work** for which he/she shall be employed; and whenever the **Commissioner** shall inform the **Contractor**, in writing, that any employee is, in his/her opinion, incompetent, unfaithful or disobedient, that employee shall be discharged from the **Work** forthwith, and shall not again be employed upon it; or

35.1.2 Any labor, materials or means whose employment, or utilization during the course of this **Contract**, may tend to or in any way cause or result in strikes, work stoppages, delays, suspension of **Work** or similar troubles by workers employed by the **Contractor** or its **Subcontractors**, or by any of the trades working in or about the buildings and premises where **Work** is being performed under this **Contract**, or by **Other Contractors** or their **Subcontractors** pursuant to other contracts, or on any other building or premises owned or operated by the **City**, its **Agencies**, departments, boards or authorities. Any violation by the **Contractor** of this requirement may, upon certification of the **Commissioner**, be considered as proper and sufficient cause for declaring the **Contractor** to be in default, and for the **City** to take action against it as set forth in Chapter X of this **Contract**, or such other article of this **Contract** as the **Commissioner** may deem proper; or

35.1.3 In accordance with Section 220.3-e of the Labor Law of the State of New York (hereinafter "Labor Law"), the **Contractor** and its **Subcontractors** shall not employ on the **Work** any apprentice, unless he/she is a registered individual, under a bona fide program

registered with the New York State Department of Labor. The allowable ratio of apprentices to journey-level workers in any craft classification shall not be greater than the ratio permitted to the **Contractor** as to its work force on any job under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered as above, shall be paid the wage rate determined by the **Comptroller of the City** for the classification of **Work** actually performed. The **Contractor** or **Subcontractor** will be required to furnish written evidence of the registration of its program and apprentices as well as all the appropriate ratios and wage rates, for the area of the construction prior to using any apprentices on the **Contract Work**.

35.2 If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand (\$250,000) dollars, all laborers, workers, and mechanics employed in the performance of the **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 (10) hours in duration.

35.3 In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the Administrative Code, respectively,

35.3.1 The **Contractor** shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making a report of information concerning conduct which such officer or employee knows or reasonably believes to involve corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority by any officer or employee relating to this **Contract** to (a) the Commissioner of the Department of Investigation, (b) a member of the New York City Council, the Public Advocate, or the **Comptroller**, or (c) the **CCPO**, **ACCO**, **Agency head**, or **Commissioner**.

35.3.2 If any of the **Contractor's** officers or employees believes that he or she has been the subject of an adverse personnel action in violation of Article 35.3.1, he or she shall be entitled to bring a cause of action against the **Contractor** to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (a) an injunction to restrain continued retaliation, (b) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (c) reinstatement of full fringe benefits and seniority rights, (d) payment of two times back pay, plus interest, and (e) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.

35.3.3 The **Contractor** shall post a notice provided by the **City** in a prominent and accessible place on any site where work pursuant to the **Contract** is performed that contains information about:

35.3.3(a) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising out of or in connection with the **Contract**; and

35.3.3(b) the rights and remedies afforded to its employees under Administrative Code sections 7-805 (the New York City False Claims Act) and 12-113 (the Whistleblower Protection Expansion Act) for lawful acts taken in connection with the reporting of allegations of fraud, false claims, criminality or corruption in connection with the **Contract**.

35.3.4 For the purposes of this Article 35.3, "adverse personnel action" includes dismissal, demotion, suspension, disciplinary action, negative performance evaluation, any action resulting in loss of staff, office space, equipment or other benefit, failure to appoint, failure to promote, or any transfer or assignment or failure to transfer or assign against the wishes of the affected officer or employee.

35.3.5 This Article 35.3 is applicable to all of the **Contractor's Subcontractors** having subcontracts with a value in excess of \$100,000; accordingly, the **Contractor** shall include this rider in all subcontracts with a value a value in excess of \$100,000.

35.4 Article 35.3 is not applicable to this **Contract** if it is valued at \$100,000 or less. Articles 35.3.1, 35.3.2, 35.3.4, and 35.3.5 are not applicable to this **Contract** if it was solicited pursuant to a finding of an emergency.

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.

36.1.5 This Article 36 covers all construction, alteration and repair of any public building or public work occurring in the State of New York and the manufacture, sale, and distribution of materials, equipment, and supplies to the extent that such operations are performed within the State of New York pursuant to this **Contract**.

36.2 The **Contractor** specifically agrees, as required by Section 6-108 of the Administrative Code, as amended, that:

36.2.1 It shall be unlawful for any person engaged in the construction, alteration or 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 Article 36.2 shall, upon conviction thereof, be punished by a fine of not more than one hundred (\$100.00) dollars or by imprisonment for not more than thirty (30) **Days**, or both.

36.3 This **Contract** is subject to the requirements of Executive Order No. 50 (1980) ("E.O. 50"), as revised, and the rules and regulations promulgated thereunder. No contract will be awarded unless and until these requirements have been complied with in their entirety. By signing this **Contract**, the **Contractor** agrees that it:

36.3.1 Will not engage in any unlawful discrimination against any employee or 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, before the award of the **Contract**, all information and reports, including an employment report, that are required by E.O. 50, the rules and regulations promulgated thereunder, and orders of the City Department of Business Services, Division of Labor Services (**DLS**) and will permit access to its books, records, and accounts by the **DLS** for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

36.4 The **Contractor** understands that in the event of its noncompliance with the nondiscrimination clauses of this **Contract** or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this **Contract** and noncompliance with E.O. 50 and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of the **DLS**, the Director of the **DLS** may direct the **Commissioner** to impose any or all of the following sanctions:

36.4.1 Disapproval of the **Contractor**; and/or

36.4.2 Suspension or termination of the **Contract**; and/or

36.4.3 Declaring the **Contractor** in default; and/or

36.4.4 In lieu of any of the foregoing sanctions, the Director of the **DLS** may impose an employment program.

In addition to any actions taken under this **Contract**, failure to comply with E.O. 50 and the rules and regulations promulgated thereunder, in one or more instances, may result in a **City Agency** declaring the **Contractor** to be non-responsible in future procurements. The **Contractor** further agrees that it will refrain from entering into any **Contract** or **Contract** modification subject to E.O. 50 and the rules and regulations promulgated thereunder with a **Subcontractor** who is not in compliance with the requirements of E.O. 50 and the rules and regulations promulgated thereunder.

36.5 The **Contractor** specifically agrees, as required by Section 6-123 of the Administrative Code, that:

36.5.1 The **Contractor** will not engage in any unlawful discriminatory practice in violation of Title 8 of the Administrative Code; and

36.5.2 Any failure to comply with this Article 36.5 may subject the **Contractor** to the remedies set forth in Section 6-123 of the Administrative Code, including, where appropriate, sanctions such as withholding of payment, imposition of an employment program, finding the **Contractor** to be in default, cancellation of the **Contract**, or any other sanction or remedy provided by **Law** or **Contract**.

ARTICLE 37. LABOR LAW REQUIREMENTS

37.1 The **Contractor** shall strictly comply with all applicable provisions of the Labor Law, as amended. Such compliance is a material term of this **Contract**.

37.2 The **Contractor** specifically agrees, as required by Labor Law Sections 220 and 220-d, as amended, that:

37.2.1 **Hours of Work:** No laborer, worker, or mechanic in the employ of the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by this **Contract** shall be permitted or required to work more than eight (8) hours in any one (1) **Day**, or more than five (5) **Days** in any one (1) week, except as provided in the Labor Law and in cases of extraordinary emergency including fire, flood, or danger to life or property, or in the case of national emergency when so proclaimed by the President of the United States of America.

37.2.2 In situations in which there are not sufficient laborers, workers, and mechanics who may be employed to carry on expeditiously the **Work** contemplated by this **Contract** as a result of such restrictions upon the number of hours and **Days** of labor, and the immediate commencement or prosecution or completion without undue delay of the **Work** is necessary for the preservation of the **Site** and/or for the protection of the life and limb of the persons using the same, such laborers, workers, and mechanics shall be permitted or required to

work more than eight (8) hours in any one (1) **Day**; or five (5) **Days** in any one (1) week; provided, however, that upon application of any **Contractor**, the **Commissioner** shall have first certified to the Commissioner of Labor of the State of New York (hereinafter "**Commissioner of Labor**") that such public **Work** is of an important nature and that a delay in carrying it to completion would result in serious disadvantage to the public; and provided, further, that such **Commissioner of Labor** shall have determined that such an emergency does in fact exist as provided in Labor Law Section 220.2.

37.2.3 Failure of the **Commissioner** to make such a certification to the **Commissioner of Labor** shall not entitle the **Contractor** to damages for delay or for any cause whatsoever.

37.2.4 Prevailing Rate of Wages: The wages to be paid for a legal day's **Work** to laborers, workers, or mechanics employed upon the **Work** contemplated by this **Contract** or upon any materials to be used thereon shall not be less than the "prevailing rate of wage" as defined in Labor Law Section 220, and as fixed by the **Comptroller** in the attached Schedule of Wage Rates and in updated schedules thereof. The prevailing wage rates and supplemental benefits to be paid are those in effect at the time the **Work** is being performed.

37.2.5 Requests for interpretation or correction in the Information for Bidders includes all requests for clarification of the classification of trades to be employed in the performance of the **Work** under this **Contract**. In the event that a trade not listed in the **Contract** is in fact employed during the performance of this **Contract**, the **Contractor** shall be required to obtain from the **Agency** the prevailing wage rates and supplementary benefits for the trades used and to complete the performance of this **Contract** at the price at which the **Contract** was awarded.

37.2.6 Minimum Wages: Except for employees whose wage is required to be fixed pursuant to Labor Law Section 220, all persons employed by the **Contractor** and any **Subcontractor** in the manufacture or furnishing of the supplies, materials, or equipment, or the furnishing of work, labor, or services, used in the performance of this **Contract**, shall be paid, without subsequent deduction or rebate unless expressly authorized by **Law**, not less than the sum mandated by **Law**.

37.3 Working Conditions: No part of the **Work**, labor or services shall be performed or rendered by the **Contractor** in any plants, factories, buildings or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of this **Contract**. Compliance with the safety, sanitary, and factory inspection **Laws** of the state in which the **Work** is to be performed shall be prima facie evidence of compliance with this Article 37.3.

37.4 Prevailing Wage Enforcement: The **Contractor** agrees to pay for all costs incurred by the City in enforcing prevailing wage requirements, including the cost of any investigation conducted by or on behalf of the **Agency** or the **Comptroller**, where the City discovers a failure to comply with any of the requirements of this Article 37 by the **Contractor** or its **Subcontractor(s)**. The **Contractor** also agrees that, should it fail or refuse to pay for any such investigation, the **Agency** is hereby authorized to deduct from a **Contractor's** account an amount equal to the cost of such investigation.

37.4.1 The Labor Law Section 220 and Section 220-d, as amended, provide that this **Contract** shall be forfeited and no sum paid for any **Work** done hereunder on a second conviction for willfully paying less than:

37.4.1(a) The stipulated prevailing wage scale as provided in Labor Law section 220, as amended, or

37.4.1(b) The stipulated minimum hourly wage scale as provided in Labor Law section 220-d, as amended.

37.4.2 For any breach or violation of either working conditions (Article 37.3) or minimum wages (Article 37.2.6) provisions, the party responsible therefor shall be liable to the City for liquidated damages, which may be withheld from any amounts due on any contracts with the City of such party responsible, or may be recovered in actions brought by the City Corporation Counsel in the name of the City, in addition to damages for any other breach of this **Contract**, for a sum equal to the amount of any underpayment of wages due to any employee engaged in the performance of this **Contract**. In addition, the **Commissioner** shall have the right to cancel contracts and enter into other contracts for the completion of the original contract, with or without public letting, and the original **Contractor** shall be liable for any additional cost. All sums withheld or recovered as deductions, rebates, refunds, or underpayment of wages hereunder, shall be held in a special deposit account and shall be paid without interest, on order of the **Comptroller**, directly to the employees who have been paid less than minimum rates of pay as set forth herein and on whose account such sums were withheld or recovered, provided that no claims by employees for such payments shall be entertained unless made within two (2) years from the date of actual notice to the **Contractor** of the withholding or recovery of such sums by the City.

37.4.3 A determination by the **Comptroller** that a **Contractor** and/or its **Subcontractor** willfully violated Labor Law Section 220 will be forwarded to the City's five District Attorneys for review.

37.4.4 The **Contractor's** or **Subcontractor's** noncompliance with this Article 37.4 and Labor Law Section 220 may result in an unsatisfactory performance evaluation and the **Comptroller** may also find and determine that the **Contractor** or **Subcontractor** willfully violated the New York Labor Law.

37.4.4(a) An unsatisfactory performance evaluation for noncompliance with this Article 37.4 may result in a determination that the **Contractor** is a non-responsible bidder on subsequent procurements with the City and thus a rejection of a future award of a contract with the City, as well as any other sanctions provided for by Law.

37.4.4(b) Labor Law Section 220-b, as amended, provides that when two (2) final determinations have been rendered against a **Contractor** or **Subcontractor** within any consecutive six (6) year period determining that such **Contractor** or **Subcontractor** has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with the Labor Law and this Article 37.4, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public works projects are rendered simultaneously, such **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the City for a period of five (5) years from the second final determination. If the final determination involves the falsification of payroll records or the kickback of wages or supplements, the **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the City for a period of five (5) years from the first final determination.

37.4.4(c) Labor Law Section 220, as amended, provides that the **Contractor** or **Subcontractor** found to have violated this Article 37.4 may be directed to make payment of wages or supplements including interest found to be due, and the **Contractor** or **Subcontractor** may be directed to make payment of a further sum 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 works project on which each worker, laborer or mechanic is entitled to receive the prevailing rate of wages and supplements for the occupation at which he or she is working. If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand (\$250,000) dollars, such notice shall also include a statement that each worker, laborer or mechanic must be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration. Such notice shall be distributed to each worker before he or she starts performing any **Work** of this **Contract** and with the first paycheck after July first of each year. "Worker, laborer or mechanic" includes employees of the **Contractor** and all **Subcontractors** and all employees of suppliers entering the **Site**. At the time of distribution, the **Contractor** shall have each worker, laborer or mechanic sign a statement, in a form provided by the **Agency**, certifying that the worker has received the notice required by this

Article 37.6.3, which signed statement shall be maintained with the payroll records required by this **Contract**; and

37.6.3(a) The **Contractor** and each **Subcontractor** shall notify each worker, laborer or mechanic employed under this **Contract** in writing of the prevailing rate of wages for their particular job classification. Such notification shall be given to every worker, laborer, and mechanic on their first pay stub and with every pay stub thereafter; and

37.6.4 **Site Laminated Identification Badges:** The **Contractor** shall provide laminated identification badges which include a photograph of the worker's, laborer's or mechanic's face and indicate the worker's, laborer's or mechanic's name, trade, employer's name, and employment starting date (month/day/year). Further, the **Contractor** shall require as 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**. The **Commissioner** may grant a written waiver from the requirement that the laminated identification badge include a photograph if the **Contractor** demonstrates that the identity of an individual wearing a laminated identification badge can be easily verified by another method; and

37.6.5 **Language Other Than English Used On Site:** Provide the **ACCO** notice when three (3) or more employees (worker and/or laborer and/or mechanic) on the **Site**, at any time, speak a language other than English. The **ACCO** will then provide the **Contractor** the notices described in Article 37.6.1 in that language or languages as may be required. The **Contractor** is responsible for all distributions under this Article 37; and

37.6.6 **Provision of Records:** The **Contractor** and **Subcontractor(s)** shall produce within five (5) **Days** on the **Site** of the **Work** and upon a written order of the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, or the **Comptroller**, such records as are required to be kept by this Article 37.6; and

37.6.7 The **Contractor** and **Subcontractor(s)** shall pay employees by check or direct deposit. If this **Contract** is for an amount greater than one million (\$1,000,000) dollars, checks issued by the **Contractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**). For any subcontract for an amount greater than seven hundred fifty thousand (\$750,000) dollars, checks issued by a **Subcontractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be 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** in default and/or the withholding of payments otherwise due under the **Contract**.

37.7 The **Contractor** and its **Subcontractors** shall keep such employment and payroll records as are required by Section 220 of the Labor Law. The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of this Article 37.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

37.8 At the time the **Contractor** makes application for each partial payment and for final payment, the **Contractor** shall submit to the **Commissioner** a written payroll certification, in the form provided by this **Contract**, of compliance with the prevailing wage, minimum wage, and other provisions and stipulations required by Labor Law Section 220 and of compliance with the training requirements of **CITY OF NEW YORK**

Labor Law Section 220-h set forth in Article 35.2. This certification of compliance shall be a condition precedent to payment and no payment shall be made to the **Contractor** unless and until each such certification shall have been submitted to and received by the **Commissioner**.

37.9 This **Contract** is executed by the **Contractor** with the express warranty and representation that the **Contractor** is not disqualified under the provisions of Section 220 of the Labor Law from the award of the **Contract**.

37.10 Any breach or violation of any of the foregoing shall be deemed a breach or violation of a material provision of this **Contract**, and grounds for cancellation thereof by the **City**.

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain on the **Site** during the performance of the **Work** the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii). The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts along with each and every payment requisition. If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both along with its payment requisitions and independently of its payment requisitions.

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the **City**.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)**, or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

38.4 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 38.1 and/or 38.2 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

ARTICLE 39. DUST HAZARDS

39.1 Should a harmful dust hazard be created in performing the **Work** of this **Contract**, for the elimination of which appliances or methods have been approved by the Board of Standards and Appeals of the City of New York, such appliances and methods shall be installed, maintained, and effectively operated during the continuance of such harmful dust hazard. Failure to comply with this provision after notice shall make this **Contract** voidable at the sole discretion of the City.

CHAPTER IX PARTIAL AND FINAL PAYMENTS

ARTICLE 40. CONTRACT PRICE

40.1 The City shall pay, and the **Contractor** agrees to accept, in full consideration for the **Contractor's** performance of the **Work** subject to the terms and conditions hereof, the lump sum price or unit prices for which this **Contract** was awarded, plus the amount required to be paid for any **Extra Work** ordered by the **Commissioner** under Article 25, less credit for any **Work** omitted pursuant to Article 29.

ARTICLE 41. BID BREAKDOWN ON LUMP SUM

41.1 Within fifteen (15) **Days** after the commencement date specified in the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Resident Engineer**, the **Contractor** shall 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 each calendar month (except where the **Commissioner** approves in writing the submission of invoices on a more frequent basis and for invoices relating to **Work** performed pursuant to a change order), the **Contractor** may submit to the **Engineer** a requisition for a partial payment in the prescribed form, which shall contain an estimate of the quantity and the fair value of the **Work** done during the payment period.

42.2 Partial payments may be made for materials, fixtures, and equipment in advance of their actual incorporation in the **Work**, as the **Commissioner** may approve, and upon the terms and conditions set forth in the General Conditions.

42.3 The **Contractor** shall also submit to the **Commissioner** in connection with every application for partial payment a verified statement in the form prescribed by the **Comptroller** setting forth the information required under Labor Law Section 220-a.

42.4 Within thirty (30) **Days** after receipt of a satisfactory payment application, and within sixty (60) **Days** after receipt of a satisfactory payment application in relation to **Work** performed pursuant to a change order, the **Engineer** will prepare and certify, and the **Commissioner** will approve, a voucher for a partial payment in the amount of such approved estimate, less any and all deductions authorized to be made by the **Commissioner** under the terms of this **Contract** or by **Law**.

ARTICLE 43. PROMPT PAYMENT

43.1 The Prompt Payment provisions of the **PPB Rules** in effect at the time of the bid will be applicable to payments made under this **Contract**. The provisions require the payment to the **Contractor** of interest on payments made after the required payment date, except as set forth in the **PPB Rules**.

43.2 The **Contractor** shall submit a proper invoice to receive payment, except where the **Contract** provides that the **Contractor** will be paid at predetermined intervals without having to submit an invoice for each scheduled payment.

43.3 Determination of interest due will be made in accordance with the **PPB Rules**.

43.4 If the **Contractor** is paid interest, the proportionate share(s) of that interest shall be forwarded by the **Contractor** to its **Subcontractor(s)**.

43.5 The **Contractor** shall pay each **Subcontractor** or **Materialman** not later than seven (7) **Days** after receipt of payment out of amounts paid to the **Contractor** by the **City** for **Work** performed by the **Subcontractor** or **Materialman** under this **Contract**.

43.5.1 If **Contractor** fails to make any payment to any **Subcontractor** or **Materialman** within seven (7) **Days** after receipt of payment by the **City** pursuant to this Article 43.5, then the **Contractor** shall pay interest on amounts due to such **Subcontractor** or **Materialman** at the rate of interest in effect on the date such payment is made by the **Contractor** computed in accordance with Section 756-b (1)(b) of the New York General Business Law. Accrual of interest shall commence on the **Day** immediately following the expiration of the seventh **Day** following receipt of payment by the **Contractor** from the **City** and shall end on the date on which payment is made.

43.6 The **Contractor** shall include in each of its subcontracts a provision requiring each **Subcontractor** to make payment to each of its **Subcontractors** or **Materialmen** for **Work** performed under this **Contract** in the same manner and within the same time period set forth above.

ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT

44.1 The **Contractor** shall submit with the **Substantial Completion** requisition:

44.1.1 A final verified statement of any pending Article 27 disputes in accordance with the **PPB Rules** and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) setting forth with respect to each

such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay.

44.1.1(a) With respect to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City Corporation Counsel** shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 44.1.1(a) is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor** upon acceptance of the **Substantial Completion** payment pursuant to this Article 44, will have waived any such claims.

44.1.2 A **Final Approved Punch List**.

44.1.3 Where required, a request for an extension of time to achieve **Substantial Completion** or final extension of time.

44.2 The **Commissioner** shall issue a voucher calling for payment of any part or all of the balance due for **Work** performed under the **Contract**, including monies retained under Article 21, less any and all deductions authorized to be made by the **Commissioner**, under this **Contract** or by **Law**, and less twice the amount the **Commissioner** considers necessary to ensure the completion of the balance of the **Work** by the **Contractor**. Such a payment shall be considered a partial and not a final payment. No **Substantial Completion** payment shall be made under this Article 44 where the **Contractor** failed to complete the **Work** within the time fixed for such completion in the Schedule A of the General Conditions, or within the time to which completion may have been extended, until an extension or extensions of time for the completion of **Work** have been acted upon pursuant to Article 13.

44.3 No further partial payments shall be made to the **Contractor** after **Substantial Completion**, except the **Substantial Completion** payment and payment pursuant to any **Contractor's** requisition that were properly filed with the **Commissioner** prior to the date of **Substantial Completion**; however, the **Commissioner** may grant a waiver for further partial payments after the date of **Substantial Completion** to permit payments for change order **Work** and/or release of retainage and deposits pursuant to Articles 21 and 24. Such waiver shall be in writing.

44.4 The **Contractor** acknowledges that nothing contained in this Article 44 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 45. FINAL PAYMENT

45.1 After completion and **Final Acceptance** of the **Work**, the **Contractor** shall submit all required certificates and documents, together with a requisition for the balance claimed to be due under the **Contract**, less the amount authorized to be retained for maintenance under Article 24. Such submission shall be within 90 days of the date of the **Commissioner's** written determination of **Final Acceptance**, or within such additional time as may be granted by the **Commissioner** in writing. If the **Contractor** fails to submit all required certificates and documents within the time allowed, no payment of the balance claimed shall be made to the **Contractor** and the **Contractor** shall be deemed to have forfeited its right to

payment of any balance claimed. A verified statement similar to that required in connection with applications for partial payments shall also be submitted to the **Commissioner**.

45.2 Amended Verified Statement of Claims: The **Contractor** shall also submit with the final requisition any amendments to the final verified statement of any pending dispute resolution procedures in accordance with the **PPB Rules** and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) that have occurred subsequent to **Substantial Completion**, setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each such item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay. With reference to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City Corporation Counsel** shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 45.2, is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor**, upon acceptance of the Final Payment pursuant to Article 46, will have waived any such claims.

45.3 Preparation of Final Voucher: Upon determining the balance due hereunder other than on account of claims, the **Engineer** will prepare and certify, for the **Commissioner's** approval, a voucher for final payment in that amount less any and all deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**. In the case of a lump sum **Contract**, the **Commissioner** shall certify the voucher for final payment within thirty (30) **Days** from the date of completion and acceptance of the **Work**, provided all requests for extensions of time have been acted upon.

45.3.1 All prior certificates and vouchers upon which partial payments were made, being merely estimates made to enable the **Contractor** to prosecute the **Work** more advantageously, shall be subject to correction in the final voucher, and the certification of the **Engineer** thereon and the approval of the **Commissioner** thereof, shall be conditions precedent to the right of the **Contractor** to receive any money hereunder. Such final voucher shall be binding and conclusive upon the **Contractor**.

45.3.2 Payment pursuant to such final voucher, less any deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**, shall constitute the final payment, and shall be made by the **Comptroller** within thirty (30) **Days** after the filing of such voucher in his/her office.

45.4 The **Contractor** acknowledges that nothing contained in this Article 45 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT

46.1 The acceptance by the **Contractor**, or by anyone claiming by or through it, of the final payment, whether such payment be made pursuant to any judgment of any court, or otherwise, shall constitute and operate as a release of the **City** from any and all claims of and liability to the **Contractor** for anything heretofore done or furnished for the **Contractor** relating to or arising out of this **Contract** and the **Work** done hereunder, and for any prior act, neglect or default on the part of the **City** or any of its officials, agents or employees, excepting only a claim against the **City** for the amounts deducted or retained in accordance with the terms and provisions of this **Contract** or by **Law**, and excepting any

claims, not otherwise waived, or any pending dispute resolution procedures which are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 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 46, or those for amounts deducted by the **Commissioner** from the final requisition or from the final payment as certified by the **Engineer** and approved by the **Commissioner**, shall not be effective to reserve such claims, anything stated to the **Contractor** orally or in writing by any official, agent or employee of the City to the contrary notwithstanding.

46.3 Should the **Contractor** refuse to accept the final payment as tendered by the **Comptroller**, it shall constitute a waiver of any right to interest thereon.

46.4 The **Contractor**, however, shall not be barred by this Article 46 from commencing an action for breach of **Contract** to the extent permitted by **Law** and by the terms of the **Contract** for any claims that are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45 or that arose after submission of the final payment requisition, provided that a detailed and verified statement of claim is served upon the contracting **Agency** and **Comptroller** not later than forty (40) **Days** after the making of such final payment by electronic funds transfer (EFT) or the mailing of such final payment. The statement shall specify the items upon which the claim will be based and any such claim shall be limited to such items.

ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION

47.1 All works of art, including paintings, mural decorations, stained glass, statues, bas-reliefs, and other sculptures, monuments, fountains, arches, and other structures of a permanent character 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 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; or if

48.1.14 The **Contractor** or any of its officers, directors, partners, five (5%) percent shareholders, principals, or other persons substantially involved in its activities, commits any of the acts or omissions specified as the grounds for debarment in the **PPB Rules**.

48.2 Before the **Commissioner** shall exercise his/her right to declare the **Contractor** in default, the **Commissioner** shall give the **Contractor** an opportunity to be heard, upon not less than two (2) **Days** notice.

ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT

49.1 The right to declare the **Contractor** in default for any of the grounds specified or referred to in Article 48 shall be exercised by sending the **Contractor** a notice, signed by the **Commissioner**, setting forth the ground or grounds upon which such default is declared (hereinafter referred to as a "Notice of Default").

49.2 The **Commissioner's** determination that the **Contractor** is in default shall be conclusive, final, and binding on the parties and such a finding shall preclude the **Contractor** from commencing a plenary action for any damages relating to the **Contract**. If the **Contractor** protests the determination of the **Commissioner**, the **Contractor** may commence an action in a court of competent jurisdiction of the State of New York under Article 78 of the New York Civil Practice Law and Rules.

ARTICLE 50. QUITTING THE SITE

50.1 Upon receipt of such notice the **Contractor** shall immediately discontinue all further operations under this **Contract** and shall immediately quit the **Site**, leaving untouched all plant, materials, equipment, tools, and supplies then on the **Site**.

ARTICLE 51. COMPLETION OF THE WORK

51.1 The **Commissioner**, after declaring the **Contractor** in default, may then have the **Work** completed by such means and in such manner, by contract with or without public letting, or otherwise, as he/she may deem advisable, utilizing for such purpose such of the **Contractor's** plant, materials, equipment, tools, and supplies remaining on the **Site**, and also such **Subcontractors**, as he/she may deem advisable.

51.2 After such completion, the **Commissioner** shall make a certificate stating the expense incurred in such completion, which shall include the cost of re-letting and also the total amount of liquidated damages (at the rate provided for in the **Contract**) from the date when the **Work** should have been completed by the **Contractor** in accordance with the terms hereof to the date of actual completion of the **Work**. Such certificate shall be binding and conclusive upon the **Contractor**, its sureties, and any person claiming under the **Contractor**, as to the amount thereof.

51.3 The expense of such completion, including any and all related and incidental costs, as so certified by the **Commissioner**, and any liquidated damages assessed against the **Contractor**, shall be charged against and deducted out of monies which are earned by the **Contractor** prior to the date of default. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

ARTICLE 52. PARTIAL DEFAULT

52.1 In case the **Commissioner** shall declare the **Contractor** in default as to a part of the **Work** only, the **Contractor** shall discontinue such part, shall continue performing the remainder of the **Work** in strict conformity with the terms of this **Contract**, and shall in no way hinder or interfere with any **Other**

Contractor(s) or persons whom the **Commissioner** may engage to complete the **Work** as to which the **Contractor** was declared in default.

52.2 The provisions of this Chapter relating to declaring the **Contractor** in default as to the entire **Work** shall be equally applicable to a declaration of partial default, except that the **Commissioner** 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 provisions of this Chapter X, the **Commissioner** shall have the power to depart from or change or vary the terms and provisions of this **Contract**, provided, however, that such departure, change or variation is made for the purpose 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 be completed in the same manner as described in Articles 51 and 53, any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List**. A written notice of the exercise of this right shall be sent to the **Contractor** who shall immediately quit the **Site** in accordance with the provisions of Article 50.

54.2 The expense of completion permitted under Article 54.1, including any and all related and incidental costs, as so certified by the **Commissioner**, shall be charged against and deducted out of monies which have been earned by the **Contractor** prior to the date of the exercise of the right set 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**.

54.3 The previous provisions of this Chapter X shall be in addition to any and all other remedies available under **Law** or in equity.

54.4 The exercise by the **City** of any remedy set forth herein shall not be deemed a waiver by the **City** of any other legal or equitable remedy contained in this **Contract** or provided under **Law**.

**CHAPTER XI
MISCELLANEOUS PROVISIONS**

ARTICLE 55. CONTRACTOR'S WARRANTIES

55.1 In consideration of, and to induce, the award of this **Contract** to the **Contractor**, the **Contractor** represents and warrants:

55.1.1 That it is financially solvent, sufficiently experienced and competent to 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 action, unless the **Contractor** shall have strictly complied with all requirements relating to the giving of notice and of information with respect to such claims, as herein before provided.

56.2 Nor shall any action be instituted or maintained on any such claims unless such action is commenced within six (6) months after **Substantial Completion**; except that:

56.2.1 Any claims arising out of events occurring after **Substantial Completion** and before **Final Acceptance** of the **Work** shall be asserted within six (6) months of **Final Acceptance** of the **Work**;

56.2.2 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 otherwise become due and payable hereunder; and

56.2.3 If the **Commissioner** exercises his/her right to terminate the **Contract** pursuant to Article 64, any such action shall be commenced within six (6) months of the date the **Commissioner** exercises said right.

ARTICLE 57. INFRINGEMENT

57.1 The **Contractor** shall be solely responsible for and shall defend, indemnify, and hold the **City** harmless from any and all claims (even if the allegations of the lawsuit are without merit) and judgments for damages and from costs and expenses to which the **City** may be subject to or which it may suffer or incur allegedly arising out of or in connection with any infringement by the **Contractor** of any copyright, trade secrets, trademark or patent rights or any other property or personal right of any third party by the **Contractor** and/or its **Subcontractors** in the performance or completion of the **Work**. Insofar as the facts or **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent permitted by **Law**.

ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES

58.1 No claim whatsoever shall be made by the **Contractor** against any official, agent or employee of the **City** for, or on account of, anything done or omitted to be done in connection with this **Contract**.

ARTICLE 59. SERVICE OF NOTICES

59.1 The **Contractor** hereby designates the business address, fax number, and email 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. Any notice, direction, or communication from either party to the other shall be in writing and shall be deemed to have been given when (i) delivered personally; (ii) sent by certified mail, return receipt requested; (iii) delivered by overnight or same day courier service in a properly addressed envelope with confirmation; or (iv) sent by fax or email and, unless receipt of the fax or e-mail is acknowledged by the recipient by fax or e-mail, deposited in a post office box regularly maintained by the United States Postal Service in a properly addressed, postage pre-paid envelope.

59.2 **Contractor's** notice address, email address, or fax number may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor**, and delivered to the **Commissioner**.

59.3 Nothing herein contained shall, however, be deemed to preclude or render inoperative the service of any notice, direction or other communication upon the **Contractor** personally, or, if the **Contractor** is a corporation, upon any officer thereof.

ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT

60.1 If this **Contract** contains any unlawful provision not an essential part of the **Contract** and which shall not appear to have been a controlling or material inducement to the making thereof, the same shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the **Contract** without affecting the binding force of the remainder.

ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED

61.1 It is the intent and understanding of the parties to this **Contract** that each and every provision of **Law** required to be inserted in this **Contract** shall be and is inserted herein. Furthermore, it is hereby stipulated that every such provision is to be deemed to be inserted herein, and if, through mistake or otherwise, any such provision is not inserted, or is not inserted in correct form, then this **Contract** shall forthwith upon the application of either party be amended by such insertion so as to comply strictly with the **Law** and without prejudice to the rights of either party hereunder.

ARTICLE 62. TAX EXEMPTION

62.1 The **City** is exempt from payment of Federal, State, and local taxes, including sales and compensating use taxes of the State of New York and its cities and counties on all tangible personal property sold to the **City** pursuant to the provisions of this **Contract**. These taxes are not to be included in bids. However, this exemption does not apply to tools, machinery, equipment or other property leased by or to the **Contractor**, **Subcontractor** or **Materialman** or to tangible personal property which, even

though it is consumed, is not incorporated into the completed **Work** (consumable supplies) and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**. The **Contractor** and its **Subcontractors** and **Materialmen** shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**.

62.2 The **Contractor** agrees to sell and the **City** agrees to purchase all tangible personal property, other than consumable supplies and other tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**, that is required, necessary or proper for or incidental to the construction of the **Project** covered by this **Contract**. The sum paid under this **Contract** for such tangible personal property shall be in full payment and consideration for the sale of such tangible personal property.

62.2.1 The **Contractor** agrees to construct the **Project** and to perform all **Work**, labor and services rendered, necessary, proper or incidental thereto for the sum shown in the bid for the performance of such **Work**, labor, and services, and the sum so paid pursuant to this **Contract** for such **Work**, labor, and services, shall be in full consideration for the performance by the **Contractor** of all its duties and obligations under this **Contract** in connection with said **Work**, labor, and services.

62.3 20 NYCRR Section 541.3(d) provides that a **Contractor's** purchases of tangible personal property that is either incorporated into real property owned by a governmental entity or purchased for and sold to a governmental entity are exempt from sales and use tax. The **City** shall not pay sales tax for any such tangible personal property that it purchases from the **Contractor** pursuant to the **Contract**. With respect to such tangible personal property, the **Contractor**, at the request of the **City**, shall furnish to the **City** such bills of sale and other instruments as may be required by the **City**, properly executed, acknowledged and delivered assuring to the **City** title to such tangible personal property, free of liens and/or encumbrances, and the **Contractor** shall mark or otherwise identify all such tangible personal property as the property of the **City**.

62.4 Title to all tangible personal property to be sold by the **Contractor** to the **City** pursuant to the provisions of the **Contract** shall immediately vest in and become the sole property of the **City** upon delivery of such tangible personal property to the **Site**. Notwithstanding such transfer of title, the **Contractor** shall have the full and continuing responsibility to install such tangible personal property in accordance with the provisions of this **Contract**, protect it, maintain it in a proper condition and forthwith repair, replace and make good any damage thereto, theft or disappearance thereof, and furnish additional tangible personal property in place of any that may be lost, stolen or rendered unusable, without cost to the **City**, until such time as the **Work** covered by the **Contract** is fully accepted by the **City**. Such transfer of title shall in no way affect any of the **Contractor's** obligations hereunder. In the event that, after title has passed to the **City**, any of the tangible personal property is rejected as being defective or otherwise unsatisfactory, title to all such tangible personal property shall be deemed to have been transferred back to the **Contractor**.

62.5 The purchase by **Subcontractors** or **Materialmen** of tangible personal property to be sold hereunder shall be a purchase or procurement for resale to the **Contractor** (either directly or through other **Subcontractors**) and therefore not subject to the aforesaid sales and compensating use taxes, provided that the subcontracts and purchase agreements provide for the resale of such tangible personal property and that such subcontracts and purchase agreements are in a form similar to this **Contract** with respect to the separation of the sale of consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work** from the **Work** and labor, services, and any other matters to be provided, and provided further that the subcontracts and

purchase agreements provide separate prices for tangible personal property and all other services and matters. Such separation shall actually be followed in practice, including the separation of payments for tangible personal property from the payments for other **Work** and labor and other things to be provided.

62.6 The **Contractor** and its **Subcontractors** and **Materialmen** shall furnish a **Contractor Exempt Purchase Certificate** to all persons, firms or corporations from which they purchase tangible personal property for the performance of the **Work** covered by this **Contract**.

62.7 In the event any of the provisions of this Article 62 shall be deemed to be in conflict with any other provisions of this **Contract** or create any ambiguity, then the provisions of this Article 62 shall control.

ARTICLE 63. INVESTIGATION(S) CLAUSE

63.1 The parties to this **Contract** agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a United States, a State of New York (State) or a City governmental agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or conducted by the Inspector General of a governmental agency that is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit or license that is the subject of the investigation, audit or inquiry.

63.2 If any person who has been advised that his/her statement, and any information from such statement, will not be used against him/her in any subsequent criminal proceeding refuses to testify before a grand jury or other governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision or public authority thereof, or the Port Authority of 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 Contract, nor the proceeds of which pledged, to an unaffiliated and unrelated institutional lender for fair value prior to the issuance of the notice scheduling the hearing, without the City incurring any penalty or damages on account of such cancellation or termination; monies lawfully due for goods delivered, work done, rentals, or fees accrued prior to the cancellation or termination shall be paid by the City.

63.7 The Commissioner shall consider and address in reaching his/her determination and 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 in this Article 63 shall be defined as a license, permit, franchise or concession not granted as a matter of right.

63.8.2 The term "person" as used in this Article 63 shall be defined as any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

63.8.3 The term "entity" as used in this Article 63 shall be defined as any firm, partnership, corporation, association, joint venture, or person that receives monies, benefits, licenses, leases, or permits from or through the City or otherwise transacts business with the City.

63.8.4 The term "member" as used in this Article 63 shall be defined as any person associated with another person or entity as a partner, director, officer, principal or employee.

63.9 In addition to and notwithstanding any other provision of this **Contract**, the **Commissioner** may in his/her sole discretion terminate this **Contract** upon not less than three (3) **Days'** written notice in the event the **Contractor** fails to promptly report in writing to the **Commissioner** of the Department of Investigations ("DOI") of the **City** any solicitation of money, goods, requests for future employment or other benefit or thing of value, by or on behalf of any employee of the **City** or other person, firm, corporation or entity for any purpose which may be related to the procurement or obtaining of this **Contract** by the **Contractor**, or affecting the performance of this **Contract**.

ARTICLE 64. TERMINATION BY THE CITY

64.1 In addition to termination pursuant to any other article of this **Contract**, the **Commissioner** may, at any time, terminate this **Contract** by written notice to the **Contractor**. In the event of termination, the **Contractor** shall, upon receipt of such notice, unless otherwise directed by the **Commissioner**:

64.1.1 Stop **Work** on the date specified in the notice;

64.1.2 Take such action as may be necessary for the protection and preservation of the **City's** materials and property;

64.1.3 Cancel all cancelable orders for material and equipment;

64.1.4 Assign to the **City** and deliver to the **Site** or another location designated by the **Commissioner**, any non-cancelable orders for material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract** and not incorporated in the **Work**;

64.1.5 Take no action which will increase the amounts payable by the **City** under this **Contract**.

64.2 In the event of termination by the **City** pursuant to this Article 64, payment to the **Contractor** shall be in accordance with Articles 64.2.1, 64.2.2 or 64.2.3, to the extent that each respective article applies.

64.2.1 Lump Sum Contracts or Items: On all lump sum **Contracts**, or on lump sum items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.1(a) and 64.2.1(b), less all payments previously made pursuant to this **Contract**. On lump sum **Contracts** only, the **City** will also pay the **Contractor** an additional sum as provided in Article 64.2.1(c).

64.2.1(a) For **Work** completed prior to the notice of termination, the **Contractor** shall be paid a pro rata portion of the lump sum bid amount, plus approved change orders, based upon the percent completion of the **Work**, as determined by the **Commissioner**. For the purpose of determining the pro rata portion of the lump sum bid amount to which the **Contractor** is entitled, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be dispositive. The **Commissioner's** determination hereunder shall be final, binding, and conclusive.

64.2.1(b) For non-cancelable material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated in the **Work**, the **Contractor** shall be paid the lesser of the following, less salvage value:

64.2.1(b)(i) The Direct Cost, as defined in Article 64.2.4; or

64.2.1(b)(ii) The fair and reasonable value, if less than Direct Cost, of such material and equipment, plus necessary and reasonable delivery costs.

64.2.1(b)(iii) In addition, the **Contractor** shall be paid five (5%) percent of the amount described in Article 64.2.1(b)(i) or Article 64.2.1(b)(ii), whichever applies.

64.2.1(c) Except as otherwise provided in Article 64.2.1(d), on all lump sum **Contracts**, the **Contractor** shall be paid the percentage indicated below applied 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 64 within ninety (90) **Days** after registration of the **Contract** with the **Comptroller**, the **Contractor** shall be paid one (1%) percent of the difference between the lump sum bid amount and the total of all payments made pursuant to this Article 64.2.

64.2.2 Unit Price Contracts or Items: On all unit price **Contracts**, or on unit price items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.2(a) and 64.2.2(b), less all payments previously made pursuant to this **Contract**:

64.2.2(a) For all completed units, the unit price stated in the **Contract**, and

64.2.2(b) For units that have been ordered but are only partially completed, the **Contractor** will be paid:

64.2.2(b)(i) A pro rata portion of the unit price stated in the **Contract** based upon the percent completion of the unit and

64.2.2(b)(ii) For non-cancelable material and equipment, payment will be made pursuant to Article 64.2.1(b).

64.2.3 Time and Materials Contracts or Items Based on Time and Material Records: On all **Contracts** or items in a **Contract** where payment for the **Work** is based on time and

material records, the **Contractor** shall be paid in accordance with Article 26, less all payments previously made pursuant to this **Contract**.

64.2.4 Direct Costs: Direct Costs as used in this Article 64.2 shall mean:

64.2.4(a) The actual purchase price of material and equipment, plus necessary and reasonable delivery costs,

64.2.4(b) The actual cost of labor involved in construction and installation at the Site, and

64.2.4(c) The actual cost of necessary bonds and insurance purchased pursuant to requirements of this **Contract** less any amounts that have been or should be refunded by the **Contractor's** sureties or insurance carriers.

64.2.4(d) Direct Costs shall not include overhead.

64.3 In no event shall any payments under this Article 64 exceed the **Contract** price for such items.

64.4 All payments pursuant to Article 64 shall be in the nature of liquidated damages and shall be accepted by the **Contractor** in full satisfaction of all claims against the City.

64.5 The City may deduct or set off against any sums due and payable pursuant to this Article 64, any deductions authorized by this **Contract** or by Law (including but not limited to liquidated damages) and any claims it may have against the **Contractor**. The City's exercise of the right to terminate the **Contract** pursuant to this Article 64 shall not impair or otherwise effect the City's right to assert any claims it may have against the **Contractor** in a plenary action.

64.6 Where the **Work** covered by the **Contract** has been substantially completed, as determined in writing by the **Commissioner**, termination of the **Work** shall be handled as an omission of **Work** pursuant to Articles 29 and 33, in which case a change order will be issued to reflect an appropriate reduction in the **Contract** sum, or if the amount is determined after final payment, such amount shall be paid by the **Contractor**.

ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE

65.1 This **Contract** shall be deemed to be executed in the City regardless of the domicile of the **Contractor**, and shall be governed by and construed in accordance with the **Laws** of the State of New York and the **Laws** of the United States, where applicable.

65.2 The parties agree that any and all claims asserted against the City arising under this **Contract** or related thereto shall be heard and determined in the courts of the State of New York ("New York State Courts") located in the City and County of New York. To effect this **Contract** and intent, the **Contractor** agrees:

65.2.1 If the City initiates any action against the **Contractor** in Federal court or in a New York State Court, service of process may be made on the **Contractor** either in person, wherever such **Contractor** may be found, or by registered mail addressed to the **Contractor** at its address as set forth in this **Contract**, or to such other address as the **Contractor** may provide to the City in writing; and

65.2.2 With respect to any action between the **City** and the **Contractor** in a New York State Court, the **Contractor** hereby expressly waives and relinquishes any rights it might otherwise have:

65.2.2(a) To move to dismiss on grounds of forum non conveniens;

65.2.2(b) To remove to Federal Court; and

65.2.2(c) To move for a change of venue to a New York State Court outside New York County.

65.2.3 With respect to any action brought by the **City** against the **Contractor** in a Federal Court located in the **City**, the **Contractor** expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a Federal Court outside the **City**.

65.2.4 If the **Contractor** commences any action against the **City** in a court located other than in the **City** and County of New York, upon request of the **City**, the **Contractor** shall either consent to a transfer of the action to a New York State Court of competent jurisdiction located in the **City** and County of New York or, if the Court where the action is initially brought will not or cannot transfer the action, the **Contractor** shall consent to dismiss such action without prejudice and may thereafter reinstate the action in a New York State Court of competent jurisdiction in New York County.

65.3 If any provision(s) of this Article 65 is held unenforceable for any reason, each and all other provision(s) shall nevertheless remain in full force and effect.

ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT

66.1 The **Contractor** agrees that neither the **Contractor** nor any substantially owned affiliated company is participating or shall participate in an international boycott in violation of the provisions of the Federal Export Administration Act of 1979, as amended, or the regulations of the United States Department of Commerce (Commerce Department) promulgated thereunder.

66.2 Upon the final determination by the Commerce Department or any other agency of the United States as to, or conviction of the **Contractor** or a substantially-owned affiliated company thereof for participation in an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder, the **Comptroller** may, at his/her option, render forfeit and void this **Contract**.

66.3 The **Contractor** shall comply in all respects, with the provisions of Section 6-114 of the Administrative Code and the rules and regulations issued by the **Comptroller** thereunder.

ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM

67.1 This **Contract** is subject to the requirements of Section 6-108.1 of the Administrative Code and regulations promulgated thereunder. No construction contract shall be awarded unless and until these requirements have been complied with in their entirety; however, compliance with this Article 67 is not required if the Agency sets Subcontractor Participation Goals for Minority- and Women-Owned Business Enterprises (M/WBEs).

67.2 Unless specifically waived by the **Commissioner** with the approval of the Division of Economic and Financial Opportunity of the City Department of Business Services, if any portion of the **Contract** is subcontracted, not less than ten (10%) percent of the total dollar amount of the **Contract** shall be awarded to locally based enterprises (LBEs); except that where less than ten (10%) percent of the total dollar amount of the **Contract** is subcontracted, such lesser percentage shall be so awarded.

67.3 The **Contractor** shall not require performance and payment bonds from LBE **Subcontractors**.

67.4 If the **Contractor** has indicated prior to award that no **Work** will be subcontracted, no **Work** shall be subcontracted without the prior approval of the **Commissioner**, which shall be granted only 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 LBEs on each subcontract until it meets the required percentage.

67.6 Failure of the **Contractor** to comply with the requirements of Section 6-108.1 of the Administrative Code and the regulations promulgated thereunder shall constitute a material breach of this **Contract**. Remedy for such breach may include the imposition of any or all of the following sanctions:

67.6.1 Reducing the **Contractor's** compensation by an amount equal to the dollar value of the percentage of the LBE subcontracting requirement not complied with;

67.6.2 Declaring the **Contractor** in default;

67.6.3 If the **Contractor** is an LBE, de-certifying and declaring the **Contractor** 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 construction of comparable quality, the **Agency** shall refer such bids to the Mayor, the Speaker or other officials, as appropriate, who may determine, in accordance with applicable **Law**, that it is in the best interest of the **City** that the **Contract** be awarded to other than the lowest responsible pursuant to Section 313(b)(2) of the **City Charter**.

69.1.4 In the case of **Contracts** let by other than competitive sealed bidding, if a prospective **Contractor** does not agree to these conditions, no **Agency**, elected official or the **City Council** shall award the **Contract** to that bidder unless the **Agency** seeking to use the goods, services or construction certifies in writing that the **Contract** is necessary for the **Agency** to perform its functions and there is no other responsible **Contractor** who will supply goods, services or construction of comparable quality at a comparable price.

69.2 In accordance with Section 6-115.1 of the Administrative Code, the **Contractor** stipulates that such **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** either:

69.2.1 Have no business operations in Northern Ireland, or

69.2.2 Shall take lawful steps in good faith to conduct any business operations they have in Northern Ireland in accordance with the MacBride Principles, and shall permit independent monitoring of their compliance with such principles.

69.3 For purposes of this Article, the following terms shall have the following meanings:

69.3.1 "MacBride Principles" shall mean those principles relating to nondiscrimination in employment and freedom of work-place opportunity which require employers doing business in Northern Ireland to:

69.3.1(a) increase the representation of individuals from under-represented religious groups in the workforce, including managerial, supervisory, administrative, clerical and technical jobs;

69.3.1(b) take steps to promote adequate security for the protection of employees from under-represented religious groups both at the work-place and while traveling 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 69 is in violation thereof, the **Agency** shall review such information and give the **Contractor** an opportunity to respond. If the **Agency** finds that a violation has occurred, the **Agency** shall have the right to declare the **Contractor** in default and/or terminate this **Contract** for cause and procure supplies, services or **Work** from another source in the manner the **Agency** deems proper. In the event of such termination, the **Contractor** shall pay to the **Agency**, or the **Agency** in its sole discretion may withhold from any amounts otherwise payable to the **Contractor**, the difference between the **Contract** price for the uncompleted portion of this **Contract** and the cost to the **Agency** of completing performance of this **Contract** either itself or by engaging another **Contractor** or **Contractors**. In the case of a requirement **Contract**, the **Contractor** shall be liable for such difference in price for the entire amount of supplies required by the **Agency** for the uncompleted term of **Contractor's Contract**. In the case of a construction **Contract**, the **Agency** shall also have the right to hold the **Contractor** in partial or total default in accordance with the default provisions of this **Contract**, and/or may seek debarment or suspension of the **Contractor**. The rights and remedies of the **Agency** hereunder shall be in addition to, and not in lieu of, any rights and remedies the **Agency** has pursuant to this **Contract** or by operation of **Law**.

ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB

70.1 The **Contractor** shall electronically file all alteration type-2 and alteration type-3 applications via the New York City Development Hub Web site, except applications for the following types of minor alterations: enlargements, curb cuts, legalizations, fire alarms, builders pavement plans, and jobs filed on Landmark Preservation Commission calendared properties. All such filings must be professionally certified. Information about electronic filing via the New York City Development Hub is available on the City Department of Buildings Web site at www.nyc.gov/buildings.

ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS

71.1 Tropical hardwoods, as defined in Section 165 of the New York State Finance Law (Finance Law), shall not be utilized in the performance of this **Contract** except as expressly permitted by Section 165 of the Finance Law.

ARTICLE 72. CONFLICTS OF INTEREST

72.1 Section 2604 of the City Charter and other related provisions of the City Charter, the Administrative Code, and the Penal Law are applicable under the terms of this Contract in relation to conflicts of interest and shall be extended to Subcontractors authorized to perform Work, labor and services pursuant to this Contract and further, it shall be the duty and responsibility of the Contractor to so inform its respective Subcontractors. Notice is hereby given that, under certain circumstances, penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

ARTICLE 73. MERGER CLAUSE

73.1 The written Contract herein, contains all the terms and conditions agreed upon by the parties hereto, and no other agreement, oral or otherwise, regarding the subject matter of this Contract shall be deemed to exist or to bind any of the parties hereto, or to vary any of the terms contained herein.

ARTICLE 74. STATEMENT OF WORK

74.1 The Contractor shall furnish all labor and materials and perform all Work in strict accordance with the Specifications and Addenda thereto, numbered _____.

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: Twenty-five million Dollars, (\$ 25,123,159.08), 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 twenty-three thousand, One hundred fifty-nine dollars and eight cents.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the Administrative Code, the Contractor agrees to accept payments under this Contract from the City by electronic funds transfer (EFT). An EFT is any transfer of funds, other than a transaction originated by check, draft or similar paper instrument, which is initiated through an electronic terminal, telephonic instrument or computer or magnetic tape so as to order, instruct or authorize a financial institution to debit or credit an account. Prior to the first payment made under this Contract, the Contractor shall designate one financial institution or other authorized payment agent and shall complete the attached "EFT Vendor Payment Enrollment Form" in order to provide the Commissioner of the City Department of Finance with information necessary for the Contractor to receive electronic funds transfer payments through a designated financial institution or authorized payment agent. The crediting of the amount of a payment to the appropriate account on the books of a financial institution or other authorized payment agent designated by the Contractor shall constitute full satisfaction by the City for the amount of the payment under this Contract. The account information supplied by the Contractor to facilitate the electronic funds transfer shall remain confidential to the fullest extent provided by Law.

76.2 The Commissioner may waive the application of the requirements of this Article 76 to payments on contracts entered into pursuant to Section 315 of the City Charter. In addition, the Commissioner of the Department of Finance and the Comptroller may jointly issue standards pursuant to

which the Agency may waive the requirements of this Article 76 for payments in the following circumstances: (i) for individuals or classes of individuals for whom compliance imposes a hardship; (ii) for classifications of types of checks; or (iii) in other circumstances as may be necessary in the interest of the City.

ARTICLE 77. RECORDS RETENTION

77.1 The Contractor agrees to retain all books, records, and other documents relevant to this Contract for six years after the final payment or termination of this Contract, whichever is later. City, state, and federal auditors and any other persons duly authorized by the City shall have full access to and the right to examine any such books, records, and other documents during the retention period.

ARTICLE 78. 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 and Local Law 1 of 2013 amended Section 6-129 of the Administrative Code of the City of New York (hereinafter "Section 6-129"). Section 6-129 establishes the program for participation in City procurement ("M/WBE Program") by minority-owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs"), certified in accordance with Section 1304 of the New York City Charter. As stated in Section 6-129, the intent of the program is to address the impact of discrimination on the City's procurement process, and to promote the public interest in avoiding fraud and favoritism in the procurement process, increasing competition for City business, and lowering contract costs. The contract provisions contained herein are pursuant to Section 6-129, and the rules of the Department of Small Business Services ("DSBS") promulgated thereunder.

If this Contract is subject to the M/WBE Program established by Section 6-129, the specific requirements of MBE and/or WBE participation for this Contract are set forth in Schedule B of the Contract (entitled the "M/WBE Utilization Plan"), and are detailed below. The Contractor must comply with all applicable MBE and WBE requirements for this Contract.

All provisions of Section 6-129 are hereby incorporated in the Contract by reference and all terms used herein that are not defined herein shall have the meanings given such terms in Section 6-129. Article I, Part A, below, sets forth provisions related to the participation goals for construction, standard and professional services contracts. Article I, Part B, below, sets forth miscellaneous provisions related to the M/WBE Program.

PART A

PARTICIPATION GOALS FOR CONSTRUCTION, STANDARD AND PROFESSIONAL SERVICES CONTRACTS OR TASK ORDERS

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

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

2. If Participation Goals have been established for this Contract or Task Orders issued pursuant to this Contract, Contractor agrees or shall agree as a material term of the Contract that Contractor shall be subject to the Participation

Goals, unless the goals are waived or modified by Agency in accordance with Section 6-129 and Part A, Sections 10 and 11 below, respectively.

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

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

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

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

(ii) **Participation Goals** on a Master Services Agreement will be established for individual Task Orders issued after the Master Services Agreement is awarded. If **Participation Goals** have been established on a Task Order, a contractor shall be required to submit a Schedule B - M/WBE Utilization Plan For Independently Registered Task Orders That Are Issued Pursuant to Master Services Agreements, Part II (see Pages 2-4) indicating: (a) whether the contractor is an MBE or WBE, or qualified joint venture; (b) the percentage of work it intends to award to direct subcontractors; and (c) in cases where the contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end. The contractor must engage in good faith efforts to meet the **Participation Goals** as established for the Task Order unless Agency has granted the contractor a pre-award waiver of the **Participation Goals** in accordance with Section 6-129 and Part A, Section 10 below.

C. **THE BIDDER/PROPOSER MUST COMPLETE THE SCHEDULE B INCLUDED HEREIN (SCHEDULE B, PART II). A SCHEDULE B SUBMITTED BY THE BIDDER/PROPOSER WHICH DOES NOT INCLUDE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS (SEE SECTION V OF PART II) WILL BE DEEMED TO BE NON-RESPONSIVE, UNLESS A FULL WAIVER OF THE PARTICIPATION GOALS IS GRANTED (SCHEDULE B, PART III). IN THE EVENT THAT THE CITY DETERMINES THAT THE BIDDER/PROPOSER HAS SUBMITTED A SCHEDULE B WHERE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS ARE COMPLETED BUT OTHER**

ASPECTS OF THE SCHEDULE B ARE NOT COMPLETE, OR CONTAIN A COPY OR COMPUTATION ERROR THAT IS AT ODDS WITH THE VENDOR CERTIFICATION AND AFFIRMATIONS, THE BIDDER/PROPOSER WILL BE NOTIFIED BY THE AGENCY AND WILL BE GIVEN FOUR (4) CALENDAR DAYS FROM RECEIPT OF NOTIFICATION TO CURE THE SPECIFIED DEFICIENCIES AND RETURN A COMPLETED SCHEDULE B TO THE AGENCY. FAILURE TO DO SO WILL RESULT IN A DETERMINATION THAT THE BID/PROPOSAL IS NON-RESPONSIVE. RECEIPT OF NOTIFICATION IS DEFINED AS THE DATE NOTICE IS E-MAILED OR FAXED (IF THE BIDDER/PROPOSER HAS PROVIDED AN E-MAIL ADDRESS OR FAX NUMBER), OR NO LATER THAN FIVE (5) CALENDAR DAYS FROM THE DATE OF MAILING OR UPON DELIVERY, IF DELIVERED.

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

6. MBE and WBE firms must be certified by DSBS in order for the Contractor to credit such firms' participation toward the attainment of the **Participation Goals**. Such certification must occur prior to the firms' commencement of work. A list of MBE and WBE firms may be obtained from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6356, 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. A firm that is certified as both an MBE and a WBE may be counted either toward the goal for MBEs or the goal for WBEs, but not both. No credit shall be given for participation by a graduate MBE or graduate WBE, as defined in Section 6-129(c)(20).

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

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

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

10. Pre-award waiver of the **Participation Goals**. (a) A bidder or proposer, or contractor with respect to a Task Order, may seek a pre-award full or partial waiver of the **Participation Goals** in accordance with Section 6-129, which

requests that Agency change one or more **Participation Goals** on the grounds that the **Participation Goals** are unreasonable in light of the availability of certified firms to perform the services required, or by demonstrating that it has legitimate business reasons for proposing a lower level of subcontracting in its M/WBE Utilization Plan.

(b) To apply for a full or partial waiver of the **Participation Goals**, a bidder, proposer, or contractor, as applicable, must complete Part III (Page 5) of Schedule B and submit such request no later than seven (7) calendar days prior to the date and time the bids, proposals, or Task Orders are due, in writing to the Agency by email at poped@ddc.nyc.gov or via facsimile at (718) 391-1886. Bidders, proposers, or contractors, as applicable, who have submitted requests will receive an Agency response by no later than two (2) calendar days prior to the due date for bids, proposals, or Task Orders; provided, however, that if that date would fall on a weekend or holiday, an Agency response will be provided by close-of-business on the business day before such weekend or holiday date.

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

(d) Agency may grant a full or partial waiver of the **Participation Goals** to a bidder, proposer or contractor, as applicable, who demonstrates—before submission of the bid, proposal or Task Order, as applicable—that it has legitimate business reasons for proposing the level of subcontracting in its M/WBE Utilization Plan. In making its determination, Agency shall consider factors that shall include, but not be limited to, whether the bidder, proposer or contractor, as applicable, has the capacity and the bona fide intention to perform the Contract without any subcontracting, or to perform the Contract without awarding the amount of subcontracts represented by the **Participation Goals**. In making such determination, Agency may consider whether the M/WBE Utilization Plan is consistent with past subcontracting practices of the bidder, proposer or contractor, as applicable, whether the bidder, proposer or contractor, as applicable, has made efforts to form a joint venture with a certified firm, and whether the bidder, proposer, or contractor, as applicable, has made good faith efforts to identify other portions of the Contract that it intends to subcontract.

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

- (i) The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;
- (ii) The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;
- (iii) The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;
- (iv) The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the M/WBE Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;
- (v) The Contractor held meetings with MBEs and/or WBEs prior to the date their bids or proposals were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids or proposals were solicited;
- (vi) The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;
- (vii) Timely written requests for assistance made by the Contractor to Agency's M/WBE liaison officer and to DSBS;

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

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

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

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

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

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

PART B: MISCELLANEOUS

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

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

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

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

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

ARTICLE II. ENFORCEMENT

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

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

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

- (a) entering into an agreement with the Contractor allowing the Contractor to cure the violation;
- (b) revoking the Contractor's pre-qualification to bid or make proposals for future contracts;
- (c) making a finding that the Contractor is in default of the Contract;
- (d) terminating the Contract;
- (e) declaring the Contractor to be in breach of Contract;
- (f) withholding payment or reimbursement;
- (g) determining not to renew the Contract;
- (h) assessing actual and consequential damages;
- (i) assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the **M/WBE** Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;
- (j) exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or
- (k) taking any other appropriate remedy.

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

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

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


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

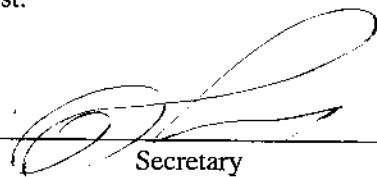
By: 
Associate Commissioner

CONTRACTOR: ZHL Group, Inc

By: 
(Member of Firm or Officer of Corporation)

Title: President

(Where Contractor is a Corporation, add):
Attest:


Secretary

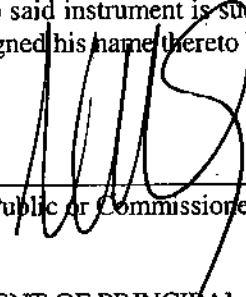
(Seal)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of New York County of Queens ss:

On this 7 day of June 2011 before me personally came Yevgeniy LVOZSKiy
to me known, who, being by me duly sworn did depose and say that he resides at
Staten Island, NY 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.

VICTORIA AYO-VAUGHAN
Notary Public, State of New York
Registration #01AY5014042
Qualified in Queens County
Commission Expires July 15, 2019


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

ACKNOWLEDGMENT BY COMMISSIONER .

State of New York County of Queens ss:

On this 7th day of June 2016, before me personally came Christine Flaherty 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

VICTORIA AYO-VAUGHAN
Notary Public, State of New York
Registration #01AY5014042
Qualified in Queens County
Commission Expires July 15, 2019

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

Twenty-five million, one hundred-twenty-three thousand, one hundred fifty-nine dollars and eight cents

Dollars (\$ 25,123,159.08)

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.


Associate 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 90 to 93): 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

PERFORMANCE BOND I
BOND #14122665
ISSUED IN QUADRUPLICATE

KNOW ALL PERSONS BY THESE PRESENTS, That we, _____

ZHL Group Inc.

2383 McDonald Ave.

Brooklyn, NY 11223

hereinafter referred to as the "Principal", and _____

The Guarantee Company of North America USA

One Towne Square, Suite 1470

Southfield, MI 48076

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

TWENTY FIVE MILLION ONE HUNDRED TWENTY THREE THOUSAND ONE HUNDRED FIFTY NINE 00/08

(\$ 25,123,159.08) 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: F175RES2/E-PIN: 85016B0048001/DDC PIN: 8502016F10002C

NEW CONSTRUCTION OF FDNY FIREHOUSE FOR RESCUE 2

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

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 failure so to do, 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, costs and judgments which may or shall be recovered against said City or its officers or agents of 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 doing of said work, or the repair or maintenance thereof, or the manner of doing the same, or the neglect of the said PRINCIPAL, or his (their, its) agents or servants, or the improper performance of the said work by the said PRINCIPAL, or his (their, its) agents or servants, or the infringement of any patent or patent rights by reason of the use of any materials furnished or work done as aforesaid or otherwise, 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, if requested to do so by the City, to fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof, if the City determines that the Principal, for any cause, has failed or neglected to fully perform and complete such Work. The Surety (Sureties) further agrees 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 such time as the City may fix. 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 Work to be performed thereunder, or by any payment 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.

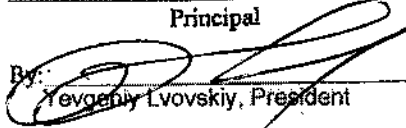
PERFORMANCE BOND 3

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 31st day of MAY 2016.

(Seal)

ZHL Group Inc. (L.S.)

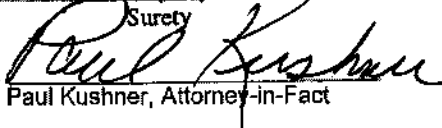
Principal

By: 
Yevgeniy Lvovskiy, President

(Seal)

The Guarantee Company of North America USA

Surety

By: 
Paul Kushner, Attorney-in-Fact

(Seal)

Surety

By: _____

(Seal)

Surety

By: _____

Bond Premium Rate \$12/8/7/6.5/6 Per M per annum plus 10% surcharge for 10 months-660 CCD's

Bond Premium Cost \$177,638.00

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by 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.

STATE OF NEW YORK

COUNTY OF NASSAU

S.S.:

On this 31st day of MAY 2016, before me personally came PAUL KUSHNER to me known, who, being by me duly sworn,

did depose and say: that (s)he resides in SOUTHAMPTON, N.Y. that (s)he is Attorney-in-Fact of the Corporation described in and which executed the attached instrument; that (s)he know the seal of said Corporation, that the seal affixed to said instrument is such corporate seal; that is was so affixed pursuant to power conferred on her/him by a Power of Attorney granted to her/him by said Corporation and that (s)he signed said instrument as Attorney-in-Fact of said Corporation pursuant to such authority.

KAREN M. PICCARO
NOTARY PUBLIC-STATE OF NEW YORK

No. 01PI6201036

Qualified in Nassau County

My Commission Expires February 09, 2017

Karen M. Piccaro
NOTARY PUBLIC

PRINCIPAL'S INDIVIDUAL ACKNOWLEDGMENT

STATE OF _____ }
COUNTY OF _____ } S.S.:

On this _____ day of _____, before me personally came _____, to me known and known to me to be the individual described in and who executed the foregoing instrument, and (s)he acknowledged to me that (s)he executed the same.

NOTARY PUBLIC

PRINCIPAL'S CORPORATE ACKNOWLEDGMENT

STATE OF New York }
COUNTY OF Kings } S.S.:

On this 1st day of June 2016, before me personally came Yevgeniy LVOVSKIY to me known, who, being by me duly sworn, did depose and say, that (s)he resides in Staten Island, NY; that (s)he is President of ZHC Group, Inc, the Corporation described in and which executed the foregoing instrument; that (s)he knows the Corporate Seal of said Corporation; and the Seal affixed to said instrument is such Corporate Seal; that it was so affixed by order of the Board of Directors of said Corporation, and that (s)he signed her/his name thereto by like order.

Maria Kim
NOTARY PUBLIC-STATE OF NEW YORK
No. 01KI6208783
NOTARY PUBLIC-qualified in Kings County
My Commission Expires July 13, 2017

PRINCIPAL'S CO-PARTNERSHIP ACKNOWLEDGMENT

STATE OF _____ }
COUNTY OF _____ } S.S.:

On this _____ day of _____, before me personally came _____, a member of the Co-partnership of _____, to me known and known to me to be the person who is described in the foregoing instrument and (s)he acknowledges that (s)he executed the same as and for the act and deed of the said Co-partnership.

NOTARY PUBLIC

THE GUARANTEE COMPANY OF NORTH AMERICA USA

Home Office, Southfield, Michigan

STATUTORY BALANCE SHEET

December 31, 2015

ASSETS

Cash and Short-Term Investments	\$ 52,709,033
Marketable Securities	145,082,101
Premium and Agents Balances (under 90 days)	3,727,495
Reinsurance Receivable on paid losses	2,517,537
Accrued Interest and Dividends	1,082,243
Other Assets	<u>1,683,650</u>
Total Admitted Assets	<u>\$206,802,059</u>

LIABILITIES

Reserve for Losses and Loss Adjustment Expenses	\$ 8,741,072
Unearned Premium Reserve	15,481,043
Accrued Expenses	2,040,120
Ceded Reinsurance Premiums Payable	2,739,108
Taxes, Licenses and Fees Payable	213,292
Net Deferred Tax Liability	1,524,277
Funds Held	6,068,366
Other Liabilities	<u>441,403</u>
Total Liabilities	<u>\$ 37,248,681</u>

CAPITAL AND SUPLUS

Common Stock and Paid-In Capital	\$144,020,970
Surplus	<u>25,532,408</u>
Total Policyholders' Surplus	<u>\$169,553,378</u>
Total Liabilities, Capital and Surplus	<u>\$206,802,059</u>

State of Michigan
County of Oakland

Stephen C. Ruschak being duly sworn, says: That he is the President & COO of The Guarantee Company of North America USA; that said company is a corporation duly organized, existing, and engaged in business as a surety by virtue of the laws of the State of Michigan, and has duly complied with all the requirements of the laws of said state applicable to said company and is duly qualified to act as surety under such laws; that said company has also complied with and is duly qualified to act as surety under the Act of Congress of July 30, 1947, as amended (6 U.S.C. 6-13); that the foregoing is a full, true and correct statement of the financial condition of said company on the 31st day of December 2015.

Sworn to before me this 3rd day of March 2016.

Cynthia A. Takal
Notary

Stephen C. Ruschak
Stephen C. Ruschak, President & COO

Cynthia A. Takal
Notary Public, State of Michigan
County of Oakland
My Commission Expires February 27, 2018
Acting in Oakland County

**CERTIFICATE OF SOLVENCY UNDER SECTION 1111 OF THE NEW
YORK INSURANCE LAW**

**STATE OF NEW YORK
DEPARTMENT OF FINANCIAL SERVICES**

It is hereby certified that

The Guarantee Company of North America USA

Of Southfield, Michigan

a corporation organized under the laws of the State of Michigan and duly authorized to transact the business of insurance in this State, is qualified to become surety or guarantor on all bonds, undertakings, recognizances, guaranties and other obligations required or permitted by law; and that the said corporation is possessed of a capital and surplus including gross paid-in and contributed surplus and unassigned funds (surplus) aggregating the sum of \$166,272,887 (Capital \$4,000,008) as is shown by its sworn financial statement for the year ending December 31, 2014 on file in this Department, prior to audit.

The said corporation cannot lawfully expose itself to loss on any one risk or hazard to an amount exceeding 10% of its surplus to policyholders, unless it shall be protected in excess of that amount in the manner provided in Section 4118 of the Insurance Law of this State.



In Witness Whereof, I have

unto set my hand and affixed

official seal of this Department
in the City of Albany, this 12th
day of June 2015.

**Benjamin M. Lawskey
Superintendent of Insurance**

By

Jacqueline Catalfamo

**Jacqueline Catalfamo
Special Deputy Superintendent**



THE GUARANTEE COMPANY OF NORTH AMERICA USA

Southfield, Michigan

POWER OF ATTORNEY

KNOW ALL BY THESE PRESENTS: That **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, a corporation organized and existing under the laws of the State of Michigan, having its principal office in Southfield, Michigan, does hereby constitute and appoint

Paul Kushner, Deborah Belton
Asset Indemnity Brokerage Corp.

its true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise.

The execution of such instrument(s) in pursuance of these presents, shall be as binding upon **THE GUARANTEE COMPANY OF NORTH AMERICA USA** as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at the principal office.

The Power of Attorney is executed and may be certified so, and may be revoked, pursuant to and by authority of Article IX, Section 9.03 of the By-Laws adopted by the Board of Directors of **THE GUARANTEE COMPANY OF NORTH AMERICA USA** at a meeting held on the 31st day of December, 2003. The President, or any Vice President, acting with any Secretary or Assistant Secretary, shall have power and authority:

1. To appoint Attorney(s)-in-fact, and to authorize them to execute on behalf of the Company, and attach the Seal of the Company thereto, bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof; and
2. To revoke, at any time, any such Attorney-in-fact and revoke the authority given, except as provided below
3. In connection with obligations in favor of the Florida Department of Transportation only, it is agreed that the power and authority hereby given to the Attorney-in-Fact includes any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts required by the State of Florida Department of Transportation. It is fully understood that consenting to the State of Florida Department of Transportation making payment of the final estimate to the Contractor and/or its assignee, shall not relieve this surety company of any of its obligations under its bond.
4. In connection with obligations in favor of the Kentucky Department of Highways only, it is agreed that the power and authority hereby given to the Attorney-in-Fact cannot be modified or revoked unless prior written personal notice of such intent has been given to the Commissioner - Department of Highways of the Commonwealth of Kentucky at least thirty (30) days prior to the modification or revocation.

Further, this Power of Attorney is signed and sealed by facsimile pursuant to resolution of the Board of Directors of the Company adopted at a meeting duly called and held on the 6th day of December 2011, of which the following is a true excerpt:

RESOLVED that the signature of any authorized officer and the seal of the Company may be affixed by facsimile to any Power of Attorney or certification thereof authorizing the execution and delivery of any bond, undertaking, contracts of indemnity and other writings obligatory in the nature thereof, and such signature and seal when so used shall have the same force and effect as though manually affixed.



IN WITNESS WHEREOF, **THE GUARANTEE COMPANY OF NORTH AMERICA USA** has caused this instrument to be signed and its corporate seal to be affixed by its authorized officer, this 23rd day of February, 2012.

THE GUARANTEE COMPANY OF NORTH AMERICA USA

Stephen C. Ruschak

Randall Musselman

STATE OF MICHIGAN
County of Oakland

Stephen C. Ruschak, Vice President

Randall Musselman, Secretary

On this 23rd day of February, 2012 before me came the individuals who executed the preceding instrument, to me personally known, and being by me duly sworn, said that each is the herein described and authorized officer of The Guarantee Company of North America USA; that the seal affixed to said instrument is the Corporate Seal of said Company; that the Corporate Seal and each signature were duly affixed by order of the Board of Directors of



Cynthia A. Takai
Notary Public, State of Michigan
County of Oakland
My Commission Expires February 27, 2018
Acting in Oakland County

IN WITNESS WHEREOF, I have hereunto set my hand at The Guarantee Company of North America USA offices the day and year above written.

Cynthia A. Takai

I, Randall Musselman, Secretary of **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, which is still in full force and effect.



IN WITNESS WHEREOF, I have thereunto set my hand and attached the seal of said Company this 31st day of May 2016

Randall Musselman

Randall Musselman, Secretary

PAYMENT BOND

PAYMENT BOND 1
BOND #14122665
ISSUED IN QUADRUPLICATE

KNOW ALL MEN BY THESE PRESENTS, That we, _____

ZHL Group, Inc.

2383 McDonald Ave.

Brooklyn, NY 11223

hereinafter referred to as the "Principal", and _____

The Guarantee Company of North America USA

One Towne Square, Suite 1470

Southfield, MI 48076

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

TWENTY FIVE MILLION ONE HUNDRED TWENTY THREE THOUSAND ONE HUNDRED FIFTY NINE 00/08

(\$25,123,159.08) 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: F175RES2/E-PIN: 85016B0048001/DDC PIN: 8502016F10002C

NEW CONSTRUCTION OF FDNY FIREHOUSE FOR RESCUE 2

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

PAYMENT BOND 2

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns and other Subcontractors to whom Work under this Contract is sublet and his or their successors and assigns shall promptly pay or cause to be paid all lawful claims for

(a) Wages and compensation for labor performed and services rendered by all persons engaged in the prosecution of the Work under said Contract, and any amendment or extension thereof or addition thereto, whether such persons be agents servants or employees of the Principal or any such Subcontractor, including all persons so engaged who perform the work of laborers or mechanics at or in the vicinity of the site of the Project regardless of any contractual relationship between the Principal or such Subcontractors, or his or their successors or assigns, on the one hand and such laborers or mechanics on the other, but not including office employees not regularly stationed at the site of the project; and

(b) Materials and supplies (whether incorporated in the permanent structure or not), as well as teams, fuels, oils, implements or machinery furnished, used or consumed by said Principal or any subcontractor at or in the vicinity of the site of the Project in the prosecution of the Work under said Contract and any amendment or extension thereof or addition thereto; then this obligation shall be void, otherwise to remain 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.

PAYMENT BOND 3

(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 4

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 31st day of MAY, 2016.

(Seal)

ZHL Group Inc. (U.S.)

Principal

By: 

Yevgeniy Lvovskiy, President

(Seal)

The Guarantee Company of North America USA

Surety

By: 

Paul Kushner, 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.

STATE OF NEW YORK

COUNTY OF NASSAU

S.S.:

On this 31ST day of MAY 2016, before me personally came PAUL KUSHNER to me known, who, being by me duly sworn,

did depose and say: that (s)he resides in SOUTHAMPTON, N.Y. that (s)he is Attorney-in-Fact of the Corporation described in and which executed the attached instrument; that (s)he know the seal of said Corporation, that the seal affixed to said instrument is such corporate seal; that it was so affixed pursuant to power conferred on her/him by a Power of Attorney granted to her/him by said Corporation and that (s)he signed said instrument as Attorney-in-Fact of said Corporation pursuant to such authority.

NOTARY PUBLIC-STATE OF NEW YORK

No. 01PI6201036

Qualified in Nassau County

My Commission Expires February 09, 2017

Karen G. Picciano
NOTARY PUBLIC

PRINCIPAL'S INDIVIDUAL ACKNOWLEDGMENT

STATE OF _____

COUNTY OF _____

S.S.:

On this _____ day of _____, before me personally came _____, to me known and known to me to be the individual described in and who executed the foregoing instrument, and (s)he acknowledged to me that (s)he executed the same.

NOTARY PUBLIC

PRINCIPAL'S CORPORATE ACKNOWLEDGMENT

STATE OF New York

COUNTY OF Kings

S.S.:

On this 1ST day of June 2016, before me personally came Yevgeniy Lvovsky, to me known, who, being by me duly sworn, did depose and say, that (s)he resides in Staten Island, NY; that (s)he is President of EPIC GROUP, INC, the Corporation described in and which executed the foregoing instrument; that (s)he knows the Corporate Seal of said Corporation; and the Seal affixed to said instrument is such Corporate Seal; that it was so affixed by order of the Board of Directors of said Corporation, and that (s)he signed her/his name thereto by like order.

MARIA KIM
NOTARY PUBLIC-STATE OF NEW YORK
No. 01KI6208783

NOTARY PUBLIC
Qualified in Kings County
My Commission Expires July 13, 2017

PRINCIPAL'S CO-PARTNERSHIP ACKNOWLEDGMENT

STATE OF _____

COUNTY OF _____

S.S.:

On this _____ day of _____, before me personally came _____, a member of the Co-partnership of _____, to me known and known to me to be the person who is described in the foregoing instrument and (s)he acknowledges that (s)he executed the same as and for the act and deed of the said Co-partnership.

NOTARY PUBLIC

THE GUARANTEE COMPANY OF NORTH AMERICA USA

Home Office, Southfield, Michigan

STATUTORY BALANCE SHEET

December 31, 2015

ASSETS

Cash and Short-Term Investments	\$ 52,709,033
Marketable Securities	145,082,101
Premium and Agents Balances (under 90 days)	3,727,495
Reinsurance Receivable on paid losses	2,517,537
Accrued Interest and Dividends	1,082,243
Other Assets	1,683,650
Total Admitted Assets	<u>\$206,802,059</u>

LIABILITIES

Reserve for Losses and Loss Adjustment Expenses	\$ 8,741,072
Unearned Premium Reserve	15,481,043
Accrued Expenses	2,040,120
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Taxes, Licenses and Fees Payable	213,292
Net Deferred Tax Liability	1,524,277
Funds Held	6,068,366
Other Liabilities	441,403
Total Liabilities	<u>\$ 37,248,681</u>

CAPITAL AND SUPPLUS

Common Stock and Paid-In Capital	\$144,020,970
Surplus	25,532,408
Total Policyholders' Surplus	<u>\$169,553,378</u>
Total Liabilities, Capital and Surplus	<u>\$206,802,059</u>

State of Michigan
County of Oakland

Stephen C. Ruschak being duly sworn, says: That he is the President & COO of The Guarantee Company of North America USA; that said company is a corporation duly organized, existing, and engaged in business as a surety by virtue of the laws of the State of Michigan, and has duly complied with all the requirements of the laws of said state applicable to said company and is duly qualified to act as surety under such laws; that said company has also complied with and is duly qualified to act as surety under the Act of Congress of July 30, 1947, as amended (6 U.S.C. 6-13); that the foregoing is a full, true and correct statement of the financial condition of said company on the 31st day of December 2015.

Sworn to before me this 3rd day of March 2016.

Cynthia A. Takal
Notary


Stephen C. Ruschak, President & COO

Cynthia A. Takal
Notary Public, State of Michigan
County of Oakland
My Commission Expires February 27, 2018
Acting in Oakland County

**CERTIFICATE OF SOLVENCY UNDER SECTION 1111 OF THE NEW
YORK INSURANCE LAW**

STATE OF NEW YORK

DEPARTMENT OF FINANCIAL SERVICES

It is hereby certified that

The Guarantee Company of North America USA

Of Southfield, Michigan

a corporation organized under the laws of the State of Michigan and duly authorized to transact the business of insurance in this State, is qualified to become surety or guarantor on all bonds, undertakings, recognizances, guaranties and other obligations required or permitted by law; and that the said corporation is possessed of a capital and surplus including gross paid-in and contributed surplus and unassigned funds (surplus) aggregating the sum of \$166,272,887 (Capital \$4,000,008) as is shown by its sworn financial statement for the year ending December 31, 2014 on file in this Department, prior to audit.

The said corporation cannot lawfully expose itself to loss on any one risk or hazard to an amount exceeding 10% of its surplus to policyholders, unless it shall be protected in excess of that amount in the manner provided in Section 4118 of the Insurance Law of this State.



In Witness Whereof, I have

unto set my hand and affixed

official seal of this Department
in the City of Albany, this 12th
day of June 2015.

Benjamin M. Lawskey
Superintendent of Insurance

By



Jacqueline Catalfamo
Special Deputy Superintendent



THE GUARANTEE COMPANY OF NORTH AMERICA USA

Southfield, Michigan

POWER OF ATTORNEY

KNOW ALL BY THESE PRESENTS: That **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, a corporation organized and existing under the laws of the State of Michigan, having its principal office in Southfield, Michigan, does hereby constitute and appoint

Paul Kushner, Deborah Belton
Asset Indemnity Brokerage Corp.

its true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise.

The execution of such instrument(s) in pursuance of these presents, shall be as binding upon **THE GUARANTEE COMPANY OF NORTH AMERICA USA** as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at the principal office.

The Power of Attorney is executed and may be certified so, and may be revoked, pursuant to and by authority of Article IX, Section 9.03 of the By-Laws adopted by the Board of Directors of **THE GUARANTEE COMPANY OF NORTH AMERICA USA** at a meeting held on the 31st day of December, 2003. The President, or any Vice President, acting with any Secretary or Assistant Secretary, shall have power and authority:

1. To appoint Attorney(s)-in-fact, and to authorize them to execute on behalf of the Company, and attach the Seal of the Company thereto, bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof; and
2. To revoke, at any time, any such Attorney-in-fact and revoke the authority given, except as provided below
3. In connection with obligations in favor of the Florida Department of Transportation only, it is agreed that the power and authority hereby given to the Attorney-in-Fact includes any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts required by the State of Florida Department of Transportation. It is fully understood that consenting to the State of Florida Department of Transportation making payment of the final estimate to the Contractor and/or its assignee, shall not relieve this surety company of any of its obligations under its bond.
4. In connection with obligations in favor of the Kentucky Department of Highways only, it is agreed that the power and authority hereby given to the Attorney-in-Fact cannot be modified or revoked unless prior written personal notice of such intent has been given to the Commissioner - Department of Highways of the Commonwealth of Kentucky at least thirty (30) days prior to the modification or revocation.

Further, this Power of Attorney is signed and sealed by facsimile pursuant to resolution of the Board of Directors of the Company adopted at a meeting duly called and held on the 6th day of December 2011, of which the following is a true excerpt:

RESOLVED that the signature of any authorized officer and the seal of the Company may be affixed by facsimile to any Power of Attorney or certification thereof authorizing the execution and delivery of any bond, undertaking, contracts of indemnity and other writings obligatory in the nature thereof, and such signature and seal when so used shall have the same force and effect as though manually affixed.



IN WITNESS WHEREOF, **THE GUARANTEE COMPANY OF NORTH AMERICA USA** has caused this instrument to be signed and its corporate seal to be affixed by its authorized officer, this 23rd day of February, 2012.

THE GUARANTEE COMPANY OF NORTH AMERICA USA

[Signature of Stephen C. Ruschak]

[Signature of Randall Musselman]

STATE OF MICHIGAN
County of Oakland

Stephen C. Ruschak, Vice President

Randall Musselman, Secretary

On this 23rd day of February, 2012 before me came the individuals who executed the preceding instrument, to me personally known, and being by me duly sworn, said that each is the herein described and authorized officer of The Guarantee Company of North America USA; that the seal affixed to said instrument is the Corporate Seal of said Company; that the Corporate Seal and each signature were duly affixed by order of the Board of Directors of



Cynthia A. Takai
Notary Public, State of Michigan
County of Oakland
My Commission Expires February 27, 2018
Acting in Oakland County

IN WITNESS WHEREOF, I have hereunto set my hand at The Guarantee Company of North America USA offices the day and year above written.

Cynthia A. Takai

I, Randall Musselman, Secretary of **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, which is still in full force and effect.



IN WITNESS WHEREOF, I have thereunto set my hand and attached the seal of said Company this 31st day of May 2016

[Signature of Randall Musselman]

Randall Musselman, Secretary



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

6/3/2016

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER First Fidelity Brokerage, Inc. 1140 Avenue of Americas, 9th Fl New York NY 10036	CONTACT NAME: Eugene Podokshik PHONE (A/C No. Ext): (212) 933-9050 FAX (A/C No): (212) 203-3612 E-MAIL ADDRESS: service@ffbinsurance.com
INSURED Z H L Group Inc 2383 MCDONALD AVE BROOKLYN NY 11223	INSURER(S) AFFORDING COVERAGE INSURER A: The Phoenix Insurance Company 25623 INSURER B: Travelers Indemnity Company 25658 INSURER C: National Union Fire Ins Co 19445 INSURER D: Standard Security Life Insurance 69078 INSURER E: INSURER F:

COVERAGES

CERTIFICATE NUMBER: Cert ID 1561

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS EXCLUSION MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADOL SUBR INSD WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
B	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input checked="" type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR <input checked="" type="checkbox"/> Contractual Liab. <input checked="" type="checkbox"/> XCU included GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> LOC OTHER:	Y	DT-CO-3F363601-IND16	1/8/2016	1/8/2017	EACH OCCURRENCE \$ 2,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 2,000,000 GENERAL AGGREGATE \$ 4,000,000 PRODUCTS - COM/OP AGG \$ 4,000,000
B	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> NON-OWNED AUTOS		BA-3F697152-16-CNS	1/8/2016	1/8/2017	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
C	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$		BE011133416	1/8/2016	1/8/2017	EACH OCCURRENCE \$ 9,000,000 AGGREGATE \$ 9,000,000
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N <input type="checkbox"/> N/A	DTNUB-6F33516A-16	3/11/2016	3/11/2017	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
D	New York Disability		R08517	3/11/2016	3/11/2017	Limit \$ Statutory

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Certificate Holder and City of New York, including its officials and employees are included as Additional Insureds in respect of General Liability as required by contract.

Ref: FIT5RE92, PIN9502016F10002C, New Construction PDNY Firehouse
Waiver of Subrogation applies. All coverages are primary and non-contributory.

CERTIFICATE HOLDER**CANCELLATION**

City of New York
Department of Design and Construction
ACCO's Office, Insurance Unit
30-30 Thomson Avenue, 4th Fl
Long Island City NY 11101

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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STATE OF NEW YORK
WORKERS' COMPENSATION BOARD

CERTIFICATE OF NYS WORKERS' COMPENSATION INSURANCE COVERAGE

1a. Legal Name and address of Insured (Use street address only) Z H L Group Inc. 2383 McDonald Avenue Brooklyn, NY 11223 <i>Work Location of Insured (Only required if coverage is specifically limited to certain locations in New York State, i.e. a Wrap-Up Policy)</i>	1b. Business Telephone Number of Insured 718.331.2807 1c. NYS Unemployment Insurance Employer Registration Number of Insured 1d. Federal Employer Identification Number of Insured or Social Security Number 57-1155659
2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder) City of New York Department of Design and Construction ACCO's Office, Insurance Unit 30-30 Thomson Avenue, 4th Floor Long Island City, NY 11101	3a. Name of Insurance Carrier The Phoenix Insurance Company 3b. Policy Number of entity listed in box "1a": DTNUB-6F33516-A-16 3c. Policy effective period: 3/11/2016 to 3/11/2017 3d. The Proprietor, Partners or Executive Officers are: <input checked="" type="checkbox"/> included. (Only check box if all partners/officers included) <input type="checkbox"/> all excluded or certain partners/officers excluded.

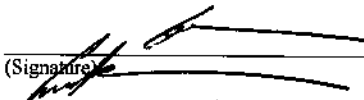
This certifies that the insurance carrier indicated above in box "3" insures the business referenced above in box "1a" for workers' compensation under the New York State Workers' Compensation Law. (To use this form, New York (NY) must be listed under **Item 3A** on the INFORMATION PAGE of the workers' compensation insurance policy). The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed above as the certificate holder in box "2".

The Insurance Carrier will also notify the above certificate holder within 10 days IF a policy is canceled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from the coverage indicated on this Certificate. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in box "3c", whichever is earlier.

Please Note: Upon the cancellation of the workers' compensation policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Workers' Compensation Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has the coverage as depicted on this form.

Approved by: Eugene Podokshik
(Print name of authorized representative or licensed agent of insurance carrier)

Approved by:  06/01/2016
(Signature) (Date)

Title: Principal

Telephone Number of authorized representative or licensed agent of insurance carrier:

Please Note: Only insurance carriers and their licensed agents are authorized to issue the C-105.2 form. Insurance brokers are **NOT** authorized to issue it.

C-105.2 (9-07)

www.wcb.state.ny.us



**Workers'
Compensation
Board**

**CERTIFICATE OF INSURANCE COVERAGE
UNDER THE NYS DISABILITY BENEFITS LAW**

PART 1. To be completed by Disability Benefits Carrier or Licensed Insurance Agent of that Carrier

1a. Legal Name & Address of Insured (use street address only) Z H L GROUP, INC. 2383 MCDONALD AVENUE BROOKLYN, NY 11223 <i>Work Location of Insured (Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)</i>	1b. Business Telephone Number of Insured 7183312807 1c. NYS Unemployment Insurance Employer Registration Number of Insured PENDING 1d. Federal Employer Identification Number of Insured or Social Security Number 57-1155659
2. Name and Address of Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder) CITY OF NEW YORK DEPARTMENT OF DESIGN AND CONSTRUCTION 3030 THOMSON AVENUE LONG ISLAND CITY, NY 11101	3a. Name of Insurance Carrier Standard Security Life Insurance Company of New York 3b. Policy Number of Entity Listed in Box "1a" R08517-000 3c. Policy effective period 3/11/2013 to 6/2/2017

4. Policy covers:

- ☒ A. All of the employer's employees eligible under the New York Disability Benefits Law
☐ B. Only the following class or classes of employer's employees:

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS Disability Benefits insurance coverage as described above.

Date Signed 6/3/2016

By

Bela A. Shapiro
(Signature of insurance carrier's authorized representative or NYS Licensed Insurance Agent of that insurance carrier)

Telephone Number (212) 355-4141

Title SUPERVISOR-DBL/POLICY SERVICES

IMPORTANT: If Box "4a" is checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.

If Box "4b" is checked, this certificate is NOT COMPLETE for purposes of Section 220, Subd. 8 of the Disability Benefits Law. It must be mailed for completion to the Workers' Compensation Board, DB Plans Acceptance Unit, 328 State Street, Schenectady, NY 12305

PART 2. To be completed by the NYS Workers' Compensation Board (Only if Box "4b" of Part 1 has been checked)

**State of New York
Workers' Compensation Board**

According to information maintained by the NYS Workers' Compensation Board, the above-named employer has complied with the NYS Disability Benefits Law with respect to all of his/her employees.

Date Signed _____

By

(Signature of NYS Workers' Compensation Board Employee)

Telephone Number _____

Title _____

Please Note: Only insurance carriers licensed to write NYS disability benefits insurance policies and NYS licensed insurance agents of those insurance carriers are authorized to issue Form DB-120.1. **Insurance brokers are NOT authorized to issue this form.**

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certification by Insurance Broker or Agent

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

First Fidelity Brokerage, Inc.

[Name of broker or agent (typewritten)]

1140 Avenue of Americas, 9th Fl, New York, NY 10019

[Address of broker or agent (typewritten)]

epod@ffbinsurance.com

[Email address of broker or agent (typewritten)]

Tel (212) 933-9050 x1801 Fax (212) 203-3612

[Phone number/Fax number of broker or agent (typewritten)]

[Signature of authorized official or broker or agent]

Eugene Podokshik, Principal

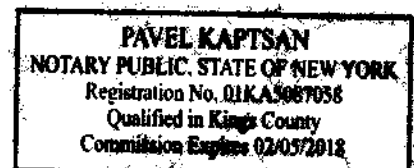
[Name and title of authorized official, broker or agent (typewritten)]

State of New York
County of Kings) ss:

Sworn to before me this

03 day of June, 2016

[Signature]
NOTARY PUBLIC FOR THE STATE OF New York



RECEIVED
JAN 10 1964
U.S. DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION
WASHINGTON, D.C. 20535

100-100000-100000

Performance Bond #1 (Pages 90 to 93): 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 90 to 93): 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)

Principal (L.S.)

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 90 to 93): 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 94 to 97): 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 94 to 97): 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 94 to 97): 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) _____ (L.S.)
Principal

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 94 to 97): 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 98 to 101): 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 98 to 101): 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 98 to 101): 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 98 to 101): 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

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**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. Pursuant to Labor Law §220 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.

This schedule is a compilation of separate determinations of the prevailing rate of wage and supplements made by the Comptroller for each trade classification listed herein pursuant to New York State Labor Law section 220 (5). The source of the wage and supplement rates, whether a collective bargaining agreement, survey data or other, is listed at the end of each classification.

Agency Chief Contracting Officers should contact the Bureau of Labor Law's Classification Unit with any questions concerning trade classifications, prevailing rates or prevailing practices with respect to procurement on New York City public works contracts. Contractors are advised to review the Comptroller's Prevailing Wage Schedule before bidding on public works contracts. Contractors with questions concerning trade classifications, prevailing rates or prevailing practices with respect to public works contracts in the procurement stage must contact the contracting agency responsible for the procurement.

Any error as to compensation under the prevailing wage law or other information as to trade classification, made by the contracting agency in the contract documents or in any other communication, will not preclude a finding against the contractor of prevailing wage violation.

Any questions concerning trade classifications, prevailing rates or prevailing practices on New York City public works contracts that have already been awarded may be directed to the Bureau of Labor Law's Classification Unit by calling (212) 669-7974. All callers must have the agency name and contract registration number available when calling with questions on public works contracts. 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.

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 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 worker, laborer, mechanic performs the work. Preliminary schedules for future one-year periods appear in the City Record on or about June 1 each succeeding year. Final schedules appear on or about July 1 in the City Record and on our web site 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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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.

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.

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

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§220 PREVAILING WAGE SCHEDULE

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ASBESTOS HANDLER

(Hazardous Material; Disturbs, removes, encapsulates, repairs, or encloses friable asbestos material)

Asbestos Handler

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$36.00

Supplemental Benefit Rate per Hour: \$15.95

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 and Local #12A)

BLASTER

Blaster

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$46.89

Supplemental Benefit Rate per Hour: \$41.19

Blaster (Hydraulic)

Effective Period: 7/1/2015 - 6/30/2016

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$47.71
Supplemental Benefit Rate per Hour: \$41.19

Blaster - Trac Drill Hydraulic

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$42.25
Supplemental Benefit Rate per Hour: \$41.19

Blaster - Wagon: Air Trac: Quarry Bar: Drillrunners

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$41.46
Supplemental Benefit Rate per Hour: \$41.19

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: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$40.42
Supplemental Benefit Rate per Hour: \$41.19

Blaster - Powder Carriers

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$36.53
Supplemental Benefit Rate per Hour: \$41.19

Blaster - Hydraulic Trac Drill Chuck Tender

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$35.25
Supplemental Benefit Rate per Hour: \$41.19

Blaster - Chuck Tender & Nipper

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$34.50
Supplemental Benefit Rate per Hour: \$41.19

Blaster - Magazine Keepers: (Watch Person)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$20.68
Supplemental Benefit Rate per Hour: \$41.19

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime Description

Magazine Keepers:

Time and one half for work performed in excess of forty (40) hours per week and for work performed on Saturdays, Sundays and Holidays.

All Other Employees:

Time and one-half for the first eight hours of work on Saturday and for Make-up Time. Double time for all hours over eight Monday through Friday (except make-up hours) and for all hours worked on Sunday and Holidays.

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$51.56

Supplemental Benefit Rate per Hour: \$41.69

Supplemental Note: For time and one half overtime - \$61.94 For double overtime - \$82.18

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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)

BRICKLAYER

Bricklayer

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$48.91

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$28.03

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$50.50

Supplemental Benefit Rate per Hour: \$45.88

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$50.50

Supplemental Benefit Rate per Hour: \$46.65

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate.

(Carpenters District Council)

CARPENTER - SIDEWALK SHED, SCAFFOLD AND HOIST

Carpenter - Hod Hoist

(Assisted by Mason Tender)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$49.60

Supplemental Benefit Rate per Hour: \$43.00

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.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

None

Shift Rates

The second shift will receive one hour at the double time rate of pay for the last hour of the shift; eight hours pay for seven hours of work, nine hours pay for eight hours of work. There must be a first shift in order to work a second shift.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Carpenters District Council)

CEMENT & CONCRETE WORKER

Cement & Concrete Worker

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$42.48**

Supplemental Benefit Rate per Hour: **\$26.57**

Supplemental Note: \$29.32 on Saturdays; \$32.07 on Sundays & Holidays

Overtime Description

Time and one half the regular rate after 7 hour day (time and one half the regular rate after an 8 hour day when working with Dockbuilders on pile cap forms and for work below street level to the top of the foundation wall, not to exceed 2 feet or 3 feet above the sidewalk-brick shelf, when working on the foundation and structure.)

Overtime

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

1/2 day before Christmas Day

1/2 day before New Year's Day

Shift Rates

On shift work extending over a twenty-four hour period, all shifts are paid at straight time.

(Cement Concrete Workers District Council)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

CEMENT MASON

Cement Mason

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$38.88

Supplemental Benefit Rate per Hour: \$39.80

Supplemental Note: For time and one half overtime - \$49.05; For double overtime - \$58.30

Overtime Description

Time and one-half the regular rate after an 8 hour day, double time the regular rate after 10 hours. Time and one-half the regular rate on Saturday, double time the regular rate after 10 hours. Double time the regular rate on Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

Any worker who reports to work on Christmas Eve or New Year's Eve pursuant to his employer's instruction shall be entitled to three (3) hours afternoon pay without working.

Shift Rates

For 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. Four Days a week at Ten (10)hour day.

(Local #780)

CORE DRILLER

Core Driller

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$36.82

Supplemental Benefit Rate per Hour: \$22.69

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Core Driller Helper

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$29.44

Supplemental Benefit Rate per Hour: \$22.69

Core Driller Helper(Third year in the industry)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$26.50

Supplemental Benefit Rate per Hour: \$22.69

Core Driller Helper (Second year in the industry)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$23.55

Supplemental Benefit Rate per Hour: \$22.69

Core Driller Helper (First year in the industry)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$20.61

Supplemental Benefit Rate per Hour: \$22.69

Overtime Description

Time and one half the regular rate for work on a holiday plus Holiday pay when worked.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Time and one half the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day

Memorial Day

Independence Day

Labor Day

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

(Carpenters District Council)

DERRICKPERSON AND RIGGER

Derrick Person & Rigger

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$44.84**

Supplemental Benefit Rate per Hour: **\$49.28**

Supplemental Note: The above supplemental rate applies for work performed in Manhattan, Bronx, Brooklyn and Queens. \$50.70 - For work performed in Staten Island.

Overtime Description

The first two hours of overtime on weekdays and the first seven hours of work on Saturdays are paid at time and one half for wages and supplemental benefits. All additional overtimes is paid at double time for wages and supplemental benefits. 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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$63.82**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$46.65

Diver Tender (Marine)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.47

Supplemental Benefit Rate per Hour: \$46.65

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

Shift Rates

When three shifts are utilized each shift shall work seven and one half-hours (7 1/2 hours) and paid for 8 hours, allowing for one half hour for lunch.

(Carpenters District Council)

DOCKBUILDER - PILE DRIVER

Dockbuilder - Pile Driver

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$50.50

Supplemental Benefit Rate per Hour: \$46.65

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.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate.

(Carpenters District Council)

DRIVER: TRUCK (TEAMSTER)

Driver - Dump Truck

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$39.53

Supplemental Benefit Rate per Hour: \$41.59

Supplemental Note: Over 40 hours worked: time and one half rate \$16.94, double time rate \$22.58

Driver - Tractor Trailer

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$39.50

Supplemental Benefit Rate per Hour: \$43.35

Supplemental Note: For over 40 hours worked: at time and one half - \$16.65; at double time - \$22.20

Driver - Euclid & Turnapull Operator

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.06

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: **\$43.35**

Supplemental Note: Over 40 hours worked: time and one half rate \$16.65 double time rate \$22.20

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).

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

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

Off single shift work commencing between 6:00 P.M. and 5:00 A.M. shall work eight and one half hours allowing for one half hour for lunch and receive 9 hours pay for 8 hours of work.

Driver Redi-Mix (Sand & Gravel)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$36.30**

Supplemental Benefit Rate per Hour: **\$40.02**

Supplemental Note: Over 40 hours worked: time and one half rate \$13.90, double time rate \$18.53

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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

Election Day

Thanksgiving Day

Christmas Day

(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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$54.00

Supplemental Benefit Rate per Hour: \$50.03

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Electrician "A" (Regular Day Overtime)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$81.00

Supplemental Benefit Rate per Hour: \$53.41

Electrician "A" (Day Shift)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$54.00

Supplemental Benefit Rate per Hour: \$50.03

Electrician "A" (Day Shift Overtime After 8 hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$81.00

Supplemental Benefit Rate per Hour: \$53.41

Electrician "A" (Swing Shift)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$63.36

Supplemental Benefit Rate per Hour: \$56.94

Electrician "A" (Swing Shift Overtime After 7.5 hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$95.04

Supplemental Benefit Rate per Hour: \$60.91

Electrician "A" (Graveyard Shift)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$70.97

Supplemental Benefit Rate per Hour: \$62.78

Electrician "A" (Graveyard Shift Overtime After 7 hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$106.46

Supplemental Benefit Rate per Hour: \$67.23

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 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. For three or less workers performing 8 hours temporary light and/or power the supplemental benefit rate is \$24.39.

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, maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$27.50

Supplemental Benefit Rate per Hour: \$20.82

First and Second Year "M" Wage Rate Per Hour: \$23.00

First and Second Year "M" Supplemental Rate: \$18.56

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$41.25

Supplemental Benefit Rate per Hour: \$22.54

First and Second Year "M" Wage Rate Per Hour: \$34.50

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

First and Second Year "M" Supplemental Rate: \$20.00

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).

New Year's Day

Martin Luther King Jr. Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

None

(Local #3)

ELECTRICIAN - ALARM TECHNICIAN

(Scope of Work - Inspect, test, repair, and replace defective, malfunctioning, or broken devices, components and controls of Fire, Burglar and Security Systems)

Alarm Technician

Effective Period: 7/1/2015 - 3/9/2016

Wage Rate per Hour: **\$31.40**

Supplemental Benefit Rate per Hour: **\$14.76**

Supplemental Note: \$13.26 only after 8 hours worked in a day

Effective Period: 3/10/2016 - 6/30/2016

Wage Rate per Hour: **\$32.00**

Supplemental Benefit Rate per Hour: **\$15.47**

Supplemental Note: \$13.97 only after 8 hours worked in a day

Overtime Description

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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. Up to 4 vacation days may be used as sick days.

(Local #3)

ELECTRICIAN-STREET LIGHTING WORKER

Electrician - Electro Pole Electrician

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$54.00

Supplemental Benefit Rate per Hour: \$51.86

Electrician - Electro Pole Foundation Installer

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.93

Supplemental Benefit Rate per Hour: \$39.46

Electrician - Electro Pole Maintainer

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$35.05

Supplemental Benefit Rate per Hour: \$35.51

Overtime Description

Electrician - Electro Pole Electrician: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week.

Electrician - Electro Pole Foundation Installer: Time and one half the regular rate after 8 hours within a 24 hour period and Saturday and Sunday.

Electrician - Electro Pole Maintainer: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week. Saturdays and Sundays may be used as a make-up day at straight time when a day is lost during the week to inclement weather.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).

New Year's Day

Martin Luther King Jr. Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

None

(Local #3)

ELEVATOR CONSTRUCTOR

Elevator Constructor

Effective Period: 7/1/2015 - 3/16/2016

Wage Rate per Hour: \$59.55

Supplemental Benefit Rate per Hour: \$31.07

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Effective Period: 3/17/2016 - 6/30/2016

Wage Rate per Hour: \$60.96

Supplemental Benefit Rate per Hour: \$32.67

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)

ELEVATOR REPAIR & MAINTENANCE

Elevator Service/Modernization Mechanic

Effective Period: 7/1/2015 - 3/16/2016

Wage Rate per Hour: \$46.92

Supplemental Benefit Rate per Hour: \$30.91

Effective Period: 3/17/2016 - 6/30/2016

Wage Rate per Hour: \$47.91

Supplemental Benefit Rate per Hour: \$32.51

Overtime Description

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

For Scheduled Service Work: Double time - work scheduled in advance by two or more workers 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

Afternoon shift - regularly hourly rate plus a (15%) fifteen percent differential. Graveyard shift - time and one half the regular rate.

Vacation

Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 15 years of service, and 6% for employees with 5 to 15 years of service, and 4% for employees with less than 5 years of service.

(Local #1)

ENGINEER

Engineer - Heavy Construction Operating Engineer I

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$64.31

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: \$102.90

Engineer - Heavy Construction Operating Engineer II

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Backhoes, Basin Machines, Groover, Mechanical Sweepers, Bobcat, Boom Truck, Barrier Transport (Barrier Mover) & machines of similar nature. Operation of Churn Drills and machines of a similar nature, Stetco Silent Hoist and machines of similar nature, Vac-Alls, Meyers Machines, John Beam and machines of a similar nature, Ross Carriers and Travel Lifts and machines of a similar nature, Bulldozers, Scrapers and Turn-a-Pulls: Tugger Hoists (Used exclusively for handling excavated material); Tractors with attachments, Hyster and Roustabout Cranes, Cherrypickers. Austin Western, Grove and machines of a similar nature, Scoopmobiles, Monorails, Conveyors, Trenchers: Loaders-Rubber Tired and Tractor: Barber Greene and Eimco Loaders and Eimco Backhoes; Mighty Midget and similar breakers and Tampers, Curb and Gutter Pavers and Motor Patrol, Motor Graders and all machines of a similar nature. Locomotives 10 Tons or under. Mini-Max, Break-Tech and machines of a similar nature; Milling machines, robotic and demolition machines and machines of a similar nature, shot blaster, skid steer machines and machines of a similar nature including bobcat, pile rig rubber-tired excavator (37,000 lbs. and under), 2 man auger.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$62.40**

Supplemental Benefit Rate per Hour: **\$34.25**

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: **\$99.84**

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$59.20**

Supplemental Benefit Rate per Hour: **\$34.25**

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: **\$94.72**

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$62.11**

Supplemental Benefit Rate per Hour: **\$34.25**

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: **\$99.38**

Engineer - Heavy Construction Maintenance Engineer II

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

On Base Mounted Tower Cranes

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$81.54

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: \$130.46

Engineer - Heavy Construction Maintenance Engineer III

On Generators, Light Towers

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$41.04

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: \$65.66

Engineer - Heavy Construction Maintenance Engineer IV

On Pumps and Mixers including mud sucking

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$42.11

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: \$67.38

Engineer - Heavy Construction Oilers I

Gradalls, Cold Planer Grader, Concrete Pumps, Driving Truck Cranes, Driving and Operating Fuel and Grease Trucks.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$56.02

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: \$89.63

Engineer - Heavy Construction Oilers II

All gasoline, electric, diesel or air operated Shovels, Draglines, Backhoes, Keystones, Pavers, Gunite Machines, Battery of Compressors, Crawler Cranes, two-person Trenching Machines.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$38.79

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: \$62.06

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Engineer - Steel Erection Maintenance Engineers

Derrick, Travelers, Tower, Crawler Tower and Climbing Cranes

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$59.77**

Supplemental Benefit Rate per Hour: **\$34.25**

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: **\$95.63**

Engineer - Steel Erection Oiler I

On a Truck Crane

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$55.95**

Supplemental Benefit Rate per Hour: **\$34.25**

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: **\$89.52**

Engineer - Steel Erection Oiler II

On a Crawler Crane

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$42.64**

Supplemental Benefit Rate per Hour: **\$34.25**

Supplemental Note: \$61.60 on overtime

Shift Wage Rate: **\$68.22**

Overtime Description

On jobs of more than one shift, if the next shift employee fails to report for work through any cause over which the employer has no control, the employee on duty who works the next shift continues to work at the single time rate.

Overtime

Double time the regular rate after an 8 hour day.

Double time the regular time rate for Saturday.

Double time the regular rate for Sunday.

Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day

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
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

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$56.88

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Engineer - Building Work Maintenance Engineers II

On Pumps, Generators, Mixers and Heaters

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.22

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Engineer - Building Work Oilers I

All gasoline, electric, diesel or air operated Gradealls: Concrete Pumps, Overhead Cranes in Power Houses: Their duties shall be to assist the Engineer in oiling, greasing and repairing of all machines; Driving Truck Cranes: Driving and Operating Fuel and Grease Trucks, Cherrypickers (hydraulic cranes) over 70,000 GVW, and machines of a similar nature.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$54.08

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

Engineer - Building Work Oilers II

Oilers on Crawler Cranes, Backhoes, Trenching Machines, Gunite Machines, Compressors (three or more in Battery).

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.21

Supplemental Benefit Rate per Hour: \$34.25

Supplemental Note: \$61.60 on overtime

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

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)

ENGINEER - CITY SURVEYOR AND CONSULTANT

Party Chief

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$37.04

Supplemental Benefit Rate per Hour: \$18.60

Supplemental Note: Overtime Benefit Rate - \$25.45 per hour (time & one half) \$32.30 per hour (double time).

Instrument Person

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$30.59

Supplemental Benefit Rate per Hour: \$18.60

Supplemental Note: Overtime Benefit Rate - \$25.45 per hour (time & one half) \$32.30 per hour (double time).

Rodperson

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$26.52

Supplemental Benefit Rate per Hour: \$18.60

Supplemental Note: Overtime Benefit Rate - \$25.45 per hour (time & one half) \$32.30 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

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (BUILDING CONSTRUCTION) (Construction of Building Projects, Concrete Superstructures, etc.)

Field Engineer - BC Party Chief

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$60.77

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime Benefit Rate - \$45.28 per hour (time & one half) \$58.15 per hour (double time).

Field Engineer - BC Instrument Person

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$47.20

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime Benefit Rate - \$45.28 per hour (time & one half) \$58.15 per hour (double time).

Field Engineer - BC Rodperson

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$30.49

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime Benefit Rate - \$45.28 per hour (time & one half) \$58.15 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

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$66.43

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime benefit rate - \$45.28 per hour (time & one half), \$58.15 per hour (double time).

Field Engineer - HC Instrument Person

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$48.82

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime benefit rate - \$45.28 per hour (time & one half), \$58.15 per hour (double time).

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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Field Engineer - HC Rodperson

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.99

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime benefit rate - \$45.28 per hour (time & one half), \$58.15 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

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$62.26

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime benefit rate - \$45.28 per hour (time & one half), \$58.15 per hour (double time).

Field Engineer - Steel Erection Instrument Person

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$48.57

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime benefit rate - \$45.28 per hour (time & one half), \$58.15 per hour (double time).

Field Engineer - Steel Erection Rodperson

Effective Period: 7/1/2015 - 6/30/2016

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\$220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$32.61

Supplemental Benefit Rate per Hour: \$32.40

Supplemental Note: Overtime benefit rate - \$45.28 per hour (time & one half), \$58.15 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

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$71.75

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$114.80

Operating Engineer - Road & Heavy Construction II

Backhoes, Power Shovels, Hydraulic Clam Shells, Steel Erection, Moles and machines of a similar nature.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$74.29

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$118.86

Operating Engineer - Road & Heavy Construction III

Mine Hoists, Cranes, etc. (Used as Mine Hoists)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$76.67
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$122.67

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: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$74.84
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$119.74

Operating Engineer - Road & Heavy Construction V

Pile Drivers & Rigs (employing Dock Builder foreperson): Derrick Boats, Tunnel Shovels.

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$73.36
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$117.38

Operating Engineer - Road & Heavy Construction VI

Mixers (Concrete with loading attachment), Concrete Pavers, Cableways, Land Derricks, Power Houses (Low Air Pressure Units).

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$69.69
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$111.50

Operating Engineer - Road & Heavy Construction VII

Barrier Movers , Barrier Transport and Machines of a Similar Nature.

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Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$56.25
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$90.00

Operating Engineer - Road & Heavy Construction VIII

Utility Compressors

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$43.63
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$55.03

Operating Engineer - Road & Heavy Construction IX

Horizontal Boring Rig

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$66.26
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$106.02

Operating Engineer - Road & Heavy Construction X

Elevators (manually operated as personnel hoist).

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$60.89
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$97.42

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: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$47.28
Supplemental Benefit Rate per Hour: \$30.40
Supplemental Note: \$55.10 overtime hours
Shift Wage Rate: \$75.65

Operating Engineer - Road & Heavy Construction XII

All Drills and Machines of a similar nature.

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Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: **\$70.42**
Supplemental Benefit Rate per Hour: **\$30.40**
Supplemental Note: **\$55.10** overtime hours
Shift Wage Rate: **\$112.67**

Operating Engineer - Road & Heavy Construction XIII

Concrete Pumps, Concrete Plant, Stone Crushers, Double Drum Hoist, Power Houses (other than above).

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: **\$68.19**
Supplemental Benefit Rate per Hour: **\$30.40**
Supplemental Note: **\$55.10** overtime hours
Shift Wage Rate: **\$109.10**

Operating Engineer - Road & Heavy Construction XIV

Concrete Mixer

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: **\$65.20**
Supplemental Benefit Rate per Hour: **\$30.40**
Supplemental Note: **\$55.10** overtime hours
Shift Wage Rate: **\$104.32**

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: 7/1/2015 - 6/30/2016
Wage Rate per Hour: **\$43.91**
Supplemental Benefit Rate per Hour: **\$30.40**
Supplemental Note: **\$55.10** overtime hours
Shift Wage Rate: **\$70.26**

Operating Engineer - Road & Heavy Construction XVI

Concrete Breaking Machines, Hoists (Single Drum), Load Masters, Locomotives (over ten tons) and Dinkies over ten tons, Hydraulic Crane-Second Engineer.

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: **\$62.25**
Supplemental Benefit Rate per Hour: **\$30.40**
Supplemental Note: **\$55.10** overtime hours
Shift Wage Rate: **\$99.60**

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Operating Engineer - Road & Heavy Construction XVII

On-Site concrete plant engineer, On-site Asphalt Plant Engineer, and Vibratory console.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$62.74

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$100.38

Operating Engineer - Road & Heavy Construction XVIII

Tower Crane

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$90.09

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$144.14

Operating Engineer - Paving I

Asphalt Spreaders, Autogrades (C.M.I.), Roto/Mil

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$69.69

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$111.50

Operating Engineer - Paving II

Asphalt Roller

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$67.87

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$108.59

Operating Engineer - Paving III

Asphalt Plants

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$57.40

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$91.84

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Operating Engineer - Concrete I

Cranes

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$74.51

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Operating Engineer - Concrete II

Compressors

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.25

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Operating Engineer - Concrete III

Micro-traps (Negative Air Machines), Vac-All Remediation System.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$59.51

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Operating Engineer - Steel Erection I

Three Drum Derricks

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$77.40

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$123.84

Operating Engineer - Steel Erection II

Cranes, 2 Drum Derricks, Hydraulic Cranes, Fork Lifts and Boom Trucks.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$74.37

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$118.99

Operating Engineer - Steel Erection III

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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Compressors, Welding Machines.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.09

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$70.54

Operating Engineer - Steel Erection IV

Compressors - Not Combined with Welding Machine.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$41.98

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Shift Wage Rate: \$67.17

Operating Engineer - Building Work I

Forklifts, Plaster (Platform machine), Plaster Bucket, Concrete Pump and all other equipment used for hoisting material.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$61.27

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Operating Engineer - Building Work II

Compressors, Welding Machines (Cutting Concrete-Tank Work), Paint Spraying, Sandblasting, Pumps (with the exclusion of Concrete Pumps), All Engines irrespective of Power (Power-Pac) used to drive Auxiliary Equipment, Air, Hydraulic, Jacking System, etc.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.85

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Operating Engineer - Building Work III

Double Drum

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$69.76

Supplemental Benefit Rate per Hour: \$30.40

Supplemental Note: \$55.10 overtime hours

Operating Engineer - Building Work IV

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Stone Derrick, Cranes, Hydraulic Cranes Boom Trucks.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$73.91**

Supplemental Benefit Rate per Hour: **\$30.40**

Supplemental Note: **\$55.10** overtime hours

Operating Engineer - Building Work V

Dismantling and Erection of Cranes, Relief Engineer.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$68.09**

Supplemental Benefit Rate per Hour: **\$30.40**

Supplemental Note: **\$55.10** overtime hours

Operating Engineer - Building Work VI

4 Pole Hoist, Single Drum Hoists.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$67.37**

Supplemental Benefit Rate per Hour: **\$30.40**

Supplemental Note: **\$55.10** overtime hours

Operating Engineer - Building Work VII

Rack & Pinion and House Cars

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$53.54**

Supplemental Benefit Rate per Hour: **\$30.40**

Supplemental Note: **\$55.10** overtime hours

For New House Car projects Wage Rate per Hour **\$42.70**

Overtime Description

On jobs of more than one shift, if an Employee fails to report for work through any cause over which the Employer has no control, the Employee on duty will continue to work at the rate of single time.

For House Cars and Rack & Pinion only: Overtime paid at time and one-half for all hours in excess of eight hours in a day, Saturday, Sunday and Holidays worked.

Overtime

Double time the regular rate after an 8 hour day.

Double time the regular time rate for Saturday.

Double time the regular rate for Sunday.

Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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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

For Steel Erection Only: Shifts may be worked at the single time rate at other than the regular working hours (8:00 A.M. to 4:30 P.M.) on the following work ONLY: Heavy construction jobs on work below the street level, over railroad tracks and on building jobs.

(Operating Engineer Local #14)

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$50.50

Supplemental Benefit Rate per Hour: \$45.88

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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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: 7/1/2015 - 10/31/2015

Wage Rate per Hour: **\$43.35**

Supplemental Benefit Rate per Hour: **\$36.59**

Supplemental Note: Supplemental Benefit Overtime Rate: **\$45.34**

Effective Period: 11/1/2015 - 6/30/2016

Wage Rate per Hour: **\$43.95**

Supplemental Benefit Rate per Hour: **\$36.84**

Supplemental Note: Supplemental Benefit Overtime Rate: **\$45.59**

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.

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$23.68

Supplemental Benefit Rate per Hour: \$19.54

Overtime

Time and one half the regular rate after an 8 hour day.

Double time the regular rate for Sunday.

Time and one half the regular 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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$57.38

Supplemental Benefit Rate per Hour: \$37.41

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

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 will be Tier A House Wreckers (i.e. 1st, 2nd, 11th, 14th etc). Other House Wreckers may be Tier B House Wreckers.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$35.52**

Supplemental Benefit Rate per Hour: **\$26.86**

House Wrecker - Tier B

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$24.90**

Supplemental Benefit Rate per Hour: **\$19.88**

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

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Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$43.20**

Supplemental Benefit Rate per Hour: **\$47.67**

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

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$48.75**

Supplemental Benefit Rate per Hour: **\$67.34**

Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

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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.

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.50

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Supplemental Benefit Rate per Hour: \$36.53

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$27.00

Supplemental Benefit Rate per Hour: \$14.55

Landscaper (3 - 6 years experience)

Effective Period: 7/1/2015 - 6/30/2016

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Wage Rate per Hour: \$26.00

Supplemental Benefit Rate per Hour: \$14.55

Landscaper (up to 3 years experience)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$23.50

Supplemental Benefit Rate per Hour: \$14.55

Groundperson

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$23.50

Supplemental Benefit Rate per Hour: \$14.55

Tree Remover / Pruner

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$32.00

Supplemental Benefit Rate per Hour: \$14.55

Landscaper Sprayer (Pesticide Applicator)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$22.00

Supplemental Benefit Rate per Hour: \$14.55

Watering - Plant Maintainer

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$17.00

Supplemental Benefit Rate per Hour: \$14.55

Overtime Description

For all overtime work performed, supplemental benefits shall include an additional seventy-five (\$0.75) cents per hour.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

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\$220 PREVAILING WAGE SCHEDULE

Christmas Day

Shift Rates

Work performed on a 4pm to 12am shift has a 15% differential. Work performed on a 12am to 8am shift has a 20% differential.

(Local #175)

MARBLE MECHANIC

Marble Setter

Effective Period: 7/1/2015 - 12/31/2015

Wage Rate per Hour: **\$51.53**

Supplemental Benefit Rate per Hour: **\$35.73**

Effective Period: 1/1/2016 - 6/30/2016

Wage Rate per Hour: **\$51.89**

Supplemental Benefit Rate per Hour: **\$36.62**

Marble Finisher

Effective Period: 7/1/2015 - 12/31/2015

Wage Rate per Hour: **\$40.53**

Supplemental Benefit Rate per Hour: **\$34.52**

Effective Period: 1/1/2016 - 6/30/2016

Wage Rate per Hour: **\$40.80**

Supplemental Benefit Rate per Hour: **\$35.15**

Marble Polisher

Effective Period: 7/1/2015 - 12/31/2015

Wage Rate per Hour: **\$36.65**

Supplemental Benefit Rate per Hour: **\$26.63**

Effective Period: 1/1/2016 - 6/30/2016

Wage Rate per Hour: **\$37.02**

Supplemental Benefit Rate per Hour: **\$27.01**

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.

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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

(Local #7)

MASON TENDER

Mason Tender

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$36.67

Supplemental Benefit Rate per Hour: \$28.02

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

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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)

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$35.46

Supplemental Benefit Rate per Hour: \$22.13

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$24.65

Supplemental Benefit Rate per Hour: \$16.45

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

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Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

(Local #79)

METALLIC LATHER

Metallic Lather

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$43.63

Supplemental Benefit Rate per Hour: \$41.57

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

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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)

MILLWRIGHT

Millwright

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$49.50

Supplemental Benefit Rate per Hour: \$52.01

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.91

Supplemental Benefit Rate per Hour: \$38.15

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$48.92 per hour.

Mosaic Mechanic - Mosaic & Terrazzo Finisher

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.30

Supplemental Benefit Rate per Hour: \$38.14

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$48.91 per hour.

Mosaic Mechanic - Machine Operator Grinder

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.30

Supplemental Benefit Rate per Hour: \$38.14

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$48.91 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

Paid Holidays

None

(Local #7)

PAINTER

Painter - Brush & Roller

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$41.00**

Supplemental Benefit Rate per Hour: **\$26.37**

Supplemental Note: \$31.00 on overtime

Spray & Scaffold / Decorative / Sandblast

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$44.00**

Supplemental Benefit Rate per Hour: **\$26.37**

Supplemental Note: \$31.00 on overtime

Overtime

Time and one half the regular rate after a 7 hour day.

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Overtime Holidays

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

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Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.30

Supplemental Benefit Rate per Hour: \$7.22

Journeyperson

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$37.48

Supplemental Benefit Rate per Hour: \$7.22

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

Martin Luther King Jr. Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Two (2) additional holidays as floating holidays

(Local #8A-28A)

PAINTER - STRIPER

Striper (paint)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$35.00

Supplemental Benefit Rate per Hour: \$12.27

Supplemental Note: Overtime Supplemental Benefit rate - \$8.02 New Hire Rate (0-3 months) - \$0.00

Lineperson (thermoplastic)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$39.00

Supplemental Benefit Rate per Hour: \$12.27

Supplemental Note: Overtime Supplemental Benefit rate - \$8.02; New Hire Rate (0-3 months) - \$0.00

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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.

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: 7/1/2015 - 9/30/2015

Wage Rate per Hour: **\$48.00**

Supplemental Benefit Rate per Hour: **\$34.58**

Effective Period: 10/1/2015 - 6/30/2016

Wage Rate per Hour: **\$49.00**

Supplemental Benefit Rate per Hour: **\$36.08**

Painter - Power Tool

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Effective Period: 7/1/2015 - 9/30/2015

Wage Rate per Hour: \$54.00

Supplemental Benefit Rate per Hour: \$34.58

Effective Period: 10/1/2015 - 6/30/2016

Wage Rate per Hour: \$55.00

Supplemental Benefit Rate per Hour: \$36.08

Overtime Description

Supplemental Benefits shall be paid for each hour worked, up to forty (40) hours per week for the period of May 1st to November 15th or up to fifty (50) hours per week for the period of November 16th to April 30th.

Overtime

Time and one half the regular rate after 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

Paid Holidays

None

Shift Rates

Regular hourly rates plus a ten per cent (10%) differential

(Local #806)

PAPERHANGER

Paperhanger

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$41.08

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.

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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.

(District Council of Painters #9)

PAVER AND ROADBUILDER

Paver & Roadbuilder - Formsetter

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.85

Supplemental Benefit Rate per Hour: \$36.92

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.98

Supplemental Benefit Rate per Hour: \$36.92

Production Paver & Roadbuilder - Screed Person

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(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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.45

Supplemental Benefit Rate per Hour: \$36.92

Production Paver & Roadbuilder - Raker

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$44.85

Supplemental Benefit Rate per Hour: \$36.92

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$41.56

Supplemental Benefit Rate per Hour: \$36.92

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 25%.

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

Presidential 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 the single time rate, except that production paving work shall be paid at 15% over the single time rate for the screed person, rakers and

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shovelers directly involved only. All other workers will be exempt. 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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$43.43

Supplemental Benefit Rate per Hour: \$27.95

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 (1/2) hour to eat with this time being included in the seven (7) hours of work.

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(Local #530)

PLASTERER - TENDER

Plasterer - Tender

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$36.67**

Supplemental Benefit Rate per Hour: **\$28.02**

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: 7/1/2015 - 6/30/2016

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Wage Rate per Hour: \$65.27

Supplemental Benefit Rate per Hour: \$28.38

Supplemental Note: Overtime supplemental benefit rate per hour: \$56.48

Plumber - Temporary Services

Temporary Services - When there are no Plumbers on the job site, there may be three shifts designed to cover the entire twenty-four hour period, including weekends if necessary, at the following rate straight time.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$52.24

Supplemental Benefit Rate per Hour: \$22.28

Overtime Description

Double time the regular rate after a 7 hour day - unless for new construction site work where the plumbing contract price is \$1.5 million or less, the hours of labor can be 8 hours per day at the employers option. On Alteration jobs when other mechanical 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)

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PLUMBER (MECHANICAL EQUIPMENT AND SERVICE)

(Mechanical Equipment and Service work shall include any repair and/or replacement of the present plumbing system.)

Plumber

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$39.27

Supplemental Benefit Rate per Hour: \$13.34

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

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.19

Supplemental Benefit Rate per Hour: \$20.62

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

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Double time the regular rate for work on the following holiday(s).

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

Shift Rates

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

Oil Trades (Installation and Maintenance)

Plumber - Pump & Tank

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$62.83

Supplemental Benefit Rate per Hour: \$21.37

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
Columbus Day
Veteran's Day
Thanksgiving Day

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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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$47.41

Supplemental Benefit Rate per Hour: \$24.40

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.

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(Bricklayer District Council)

ROOFER

Roofer

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$40.70**

Supplemental Benefit Rate per Hour: **\$30.17**

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: 7/1/2015 - 6/30/2016

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§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$47.41

Supplemental Benefit Rate per Hour: \$24.40

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)

SHEET METAL WORKER

Sheet Metal Worker

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$46.96

Supplemental Benefit Rate per Hour: \$45.19

Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Sheet Metal Worker - Fan Maintenance

(The temporary operation of fans or blowers in new or existing buildings for heating and/or ventilation, and/or air conditioning prior to the completion of the project.)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$37.57

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$45.19

Sheet Metal Worker - Duct Cleaner

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$12.90

Supplemental Benefit Rate per Hour: \$8.07

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.

(Local #28)

SHEET METAL WORKER - SPECIALTY
(Decking & Siding)

Sheet Metal Specialty Worker

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

The first worker to perform this work must be paid at the rate of the Sheet Metal Worker. The second and third workers shall be paid the Specialty Worker Rate. The ratio of One Sheet Metal Worker, then Two Specialty Workers shall be utilized thereafter.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$42.64**

Supplemental Benefit Rate per Hour: **\$23.62**

Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

Martin Luther King Jr. Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

(Local #28)

SHIPYARD WORKER

Shipyard Mechanic - First Class

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$27.54**

Supplemental Benefit Rate per Hour: **\$3.01**

Shipyard Mechanic - Second Class

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$20.22**

Supplemental Benefit Rate per Hour: **\$2.73**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Shipyard Laborer - First Class

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$20.90
Supplemental Benefit Rate per Hour: \$2.75

Shipyard Laborer - Second Class

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$13.86
Supplemental Benefit Rate per Hour: \$2.48

Shipyard Dockhand - First Class

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$23.61
Supplemental Benefit Rate per Hour: \$2.86

Shipyard Dockhand - Second Class

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$15.94
Supplemental Benefit Rate per Hour: \$2.56

Overtime Description

Work performed on holiday is paid double time the regular hourly wage rate plus holiday pay.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Based on Survey Data

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

SIGN ERECTOR

(Sheet Metal, Plastic, Electric, and Neon)

Sign Erector

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.60

Supplemental Benefit Rate per Hour: \$46.28

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.

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$55.00

Supplemental Benefit Rate per Hour: \$52.79

Supplemental Note: Overtime supplemental benefit rate: \$104.84

Steamfitter -Temporary Services

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

The steamfitters shall not do any other work and shall not be permitted to work more than one shift in a twenty-four hour day. When steamfitters are present during the regular working day, no temporary services steamfitter will be required

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$41.80

Supplemental Benefit Rate per Hour: \$42.76

Supplemental Note: .

Overtime

Double time the regular rate after a 7 hour day.

Double time the regular time rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$55.00

Supplemental Benefit Rate per Hour: \$52.79

Supplemental Note: Overtime supplemental benefit rate: \$104.84

Steamfitter -Temporary Services

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

The steamfitters shall not do any other work and shall not be permitted to work more than one shift in a twenty-four hour day. When steamfitters are present during the regular working day, no temporary services steamfitter will be required.

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$41.80**

Supplemental Benefit Rate per Hour: **\$42.76**

Overtime

Double time the regular rate after an 8 hour day.

Double time the regular time rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

None

Shift Rates

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$39.25
Supplemental Benefit Rate per Hour: \$13.81

Refrigeration and Air Conditioner Service Person V

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$32.25
Supplemental Benefit Rate per Hour: \$12.44

Refrigeration and Air Conditioner Service Person IV

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$26.72
Supplemental Benefit Rate per Hour: \$11.30

Refrigeration and Air Conditioner Service Person III

Filter changing and maintenance thereof, oil and greasing, tower and coil cleaning, scraping and painting, general housekeeping, taking of water samples.

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$22.93
Supplemental Benefit Rate per Hour: \$10.45

Refrigeration and Air Conditioner Service Person II

Filter changing and maintenance thereof, oil and greasing, tower and coil cleaning, scraping and painting, general housekeeping, taking of water samples.

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$19.02
Supplemental Benefit Rate per Hour: \$9.67

Refrigeration and Air Conditioner Service Person I

Filter changing and maintenance thereof, oil and greasing, tower and coil cleaning, scraping and painting, general housekeeping, taking of water samples.

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$13.91
Supplemental Benefit Rate per Hour: \$8.78

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$47.20**

Supplemental Benefit Rate per Hour: **\$37.15**

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.

Shift Rates

For all 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: 7/1/2015 - 12/29/2015

Wage Rate per Hour: **\$46.32**

Supplemental Benefit Rate per Hour: **\$22.66**

Effective Period: 12/30/2015 - 6/30/2016

Wage Rate per Hour: **\$46.82**

Supplemental Benefit Rate per Hour: **\$22.66**

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$40.35

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Thanksgiving Day
Christmas Day

Employees have the option of observing either Martin Luther King's Birthday or the day after Thanksgiving instead of Lincoln's Birthday

Shift Rates

For any workday that starts before 8A.M. or ends after 6P.M. there is a 10% differential for the applicable worker's hourly rate.

Vacation

After 6 months.....one week.
After 12 months but less than 7 years.....two weeks.
After 7 or more but less than 15 years.....three weeks.
After 15 years or more but less than 25 years.....four weeks.

(C.W.A.)

TILE FINISHER

Tile Finisher

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$40.03**

Supplemental Benefit Rate per Hour: **\$29.71**

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$51.61

Supplemental Benefit Rate per Hour: \$33.46

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)

TIMBERPERSON

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Timberperson

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$45.60

Supplemental Benefit Rate per Hour: \$46.67

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.

Time and one half the regular hourly rate after 40 hours in any work week.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate.

(Local #1536)

TUNNEL WORKER

Blasters, Mucking Machine Operators (Compressed Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$59.17

Supplemental Benefit Rate per Hour: \$49.45

Tunnel Workers (Compressed Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$57.12

Supplemental Benefit Rate per Hour: \$47.80

Top Nipper (Compressed Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$56.07

Supplemental Benefit Rate per Hour: \$46.96

Outside Lock Tender, Outside Gauge Tender, Muck Lock Tender (Compressed Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$55.06

Supplemental Benefit Rate per Hour: \$46.07

Bottom Bell & Top Bell Signal Person: Shaft Person (Compressed Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$55.06

Supplemental Benefit Rate per Hour: \$46.07

Changehouse Attendant: Powder Watchperson (Compressed Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$48.16

Supplemental Benefit Rate per Hour: \$43.62

Blasters (Free Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$56.47

Supplemental Benefit Rate per Hour: \$47.47

Tunnel Workers (Free Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$54.04

Supplemental Benefit Rate per Hour: \$45.45

All Others (Free Air Rates)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$49.93

Supplemental Benefit Rate per Hour: \$42.06

Microtunneling (Free Air Rates)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$43.23

Supplemental Benefit Rate per Hour: \$36.36

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.

For Small-Bore Micro Tunneling Machines - Time and one-half the regular rate shall be paid for all overtime.

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.

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.

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ASBESTOS HANDLER

(Ratio of Apprentice Journeyperson: 1 to 1, 1 to 3)

Asbestos Handler (First 1000 Hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 78% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$15.95

Asbestos Handler (Second 1000 Hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$15.95

Asbestos Handler (Third 1000 Hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 83% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$15.95

Asbestos Handler (Fourth 1000 Hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 89% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$15.95

(Local #78)

BOILERMAKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Boilermaker (First Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 65% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$30.00

Boilermaker (Second Year: 1st Six Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 70% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate Per Hour: \$31.66

Boilermaker (Second Year: 2nd Six Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 75% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$33.32

Boilermaker (Third Year: 1st Six Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$35.00

Boilermaker (Third Year: 2nd Six Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 85% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$36.67

Boilermaker (Fourth Year: 1st Six Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 90% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$38.34

Boilermaker (Fourth Year: 2nd Six Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 95% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$40.01

(Local #5)

BRICKLAYER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Bricklayer (First 750 Hours)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Second 750 Hours)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Third 750 Hours)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Fourth 750 Hours)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Fifth 750 Hours)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Sixth 750 Hours)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$17.10

(Bricklayer District Council)

CARPENTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Carpenter (First Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.14

Carpenter (Second Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.14

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Carpenter (Third Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.14

Carpenter (Fourth Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.14

(Carpenters District Council)

CEMENT MASON

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cement Mason (First Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's Rate

Cement Mason (Second Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's Rate

Cement Mason (Third Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's Rate

(Local #780)

CEMENT AND CONCRETE WORKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Cement & Concrete Worker (First 1333 hours)

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Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 50% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$18.84

Cement & Concrete Worker (Second 1333 hours)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$24.65

Cement & Concrete Worker (Last 1334 hours)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$25.47

(Cement Concrete Workers District Council)

DERRICKPERSON & RIGGER (STONE)
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Derrickperson & Rigger (stone) - First Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 50% of Journeyman's rate
Supplemental Benefit Rate Per Hour: 50% of Journeyman's rate

Derrickperson & Rigger (stone) - Second Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyman's rate

Derrickperson & Rigger (stone) - Second Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyman's rate

Derrickperson & Rigger (stone) - Third Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 90% of Journeyman's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyman's rate

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(Local #197)

DOCKBUILDER/PILE DRIVER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 6)

Dockbuilder/Pile Driver (First Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 40% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.52

Dockbuilder/Pile Driver (Second Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.52

Dockbuilder/Pile Driver (Third Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 65% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.52

Dockbuilder/Pile Driver (Fourth Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 80% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.52

(Carpenters District Council)

ELECTRICIAN

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Electrician (First Term: 0-6 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$13.00

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Supplemental Benefit Rate per Hour: \$11.61
Overtime Supplemental Rate Per Hour: \$12.47

Electrician (First Term: 7-12 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$14.00
Supplemental Benefit Rate per Hour: \$12.12
Overtime Supplemental Rate Per Hour: \$13.04

Electrician (Second Term: 0-6 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$15.00
Supplemental Benefit Rate per Hour: \$12.63
Overtime Supplemental Rate Per Hour: \$13.62

Electrician (Second Term: 7-12 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$16.00
Supplemental Benefit Rate per Hour: \$13.14
Overtime Supplemental Rate Per Hour: \$14.19

Electrician (Third Term: 0-6 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$17.00
Supplemental Benefit Rate per Hour: \$13.65
Overtime Supplemental Rate Per Hour: \$14.77

Electrician (Third Term: 7-12 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$18.00
Supplemental Benefit Rate per Hour: \$14.16
Overtime Supplemental Rate Per Hour: \$15.34

Electrician (Fourth Term: 0-6 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$19.00
Supplemental Benefit Rate per Hour: \$14.67
Overtime Supplemental Rate Per Hour: \$15.92

Electrician (Fourth Term: 7-12 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$21.00

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Supplemental Benefit Rate per Hour: \$15.68
Overtime Supplemental Rate Per Hour: \$17.07

Electrician (Fifth Term: 0-12 Months - Hired on or after 5/10/07)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$23.00
Supplemental Benefit Rate per Hour: \$18.56
Overtime Supplemental Rate Per Hour: \$20.00

Electrician (Fifth Term: 13-18 Months - Hired on or after 5/10/07)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$27.50
Supplemental Benefit Rate per Hour: \$20.82
Overtime Supplemental Rate Per Hour: \$22.54

Electrician (Fifth Term: 0-18 Months - Hired before 5/10/07)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$26.80
Supplemental Benefit Rate per Hour: \$20.46
Overtime Supplemental Rate Per Hour: \$22.14

Overtime Description

Overtime Wage paid at time and one half the regular rate
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: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$26.94

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$28.41

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Elevator (Constructor) - Second Year

Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$27.35

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$28.84

Elevator (Constructor) - Third Year

Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$28.17

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$29.69

Elevator (Constructor) - Fourth Year

Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: \$29.00

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.54

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator Service/Modernization Mechanic (First Year)

Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: \$26.87

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.34

Elevator Service/Modernization Mechanic (Second Year)

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Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: \$27.27

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.76

Elevator Service/Modernization Mechanic (Third Year)

Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.08

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: \$29.60

Elevator Service/Modernization Mechanic (Fourth Year)

Effective Period: 7/1/2015 - 3/16/2016
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.89

Effective Period: 3/17/2016 - 6/30/2016
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: \$30.43

(Local #1)

ENGINEER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Engineer - First Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$23.68
Supplemental Benefit Rate per Hour: \$22.55

Engineer - Second Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$29.60
Supplemental Benefit Rate per Hour: \$22.55

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Engineer - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$32.56

Supplemental Benefit Rate per Hour: \$22.55

Engineer - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$35.52

Supplemental Benefit Rate per Hour: \$22.55

(Local #15)

ENGINEER - OPERATING

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Operating Engineer - First Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour 40% of Journeyperson's Rate

Supplemental Benefit Per Hour: \$20.15

Operating Engineer - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyperson's Rate

Supplemental Benefit Per Hour: \$20.15

Operating Engineer - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 60% of Journeyperson's Rate

Supplemental Benefit Per Hour: \$20.15

(Local #14)

FLOOR COVERER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Floor Coverer (First Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 40% of Journeyman's rate

Supplemental Rate Per Hour: \$31.14

Floor Coverer (Second Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyman's rate

Supplemental Rate Per Hour: \$31.14

Floor Coverer (Third Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 65% of Journeyman's rate

Supplemental Rate Per Hour: \$31.14

Floor Coverer (Fourth Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 80% of Journeyman's rate

Supplemental Rate Per Hour: \$31.14

(Carpenters District Council)

GLAZIER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Glazier (First Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 40% of Journeyman's rate

Supplemental Rate Per Hour: \$13.64

Effective 11/1/2015 - Supplemental Rate Per Hour: \$13.79

Glazier (Second Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyman's rate

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Supplemental Rate Per Hour: \$22.97
Effective 11/1/2015 - Supplemental Rate Per Hour: \$23.13

Glazier (Third Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 60% of Journeyman's rate
Supplemental Rate Per Hour: \$25.87
Effective 11/1/2015 - Supplemental Rate Per Hour: \$26.03

Glazier (Fourth Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Rate Per Hour: \$31.04
Effective 11/1/2015 - Supplemental Rate Per Hour: \$31.29

(Local #1281)

HEAT & FROST INSULATOR

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Heat & Frost Insulator (First Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 40% of Journeyman's rate

Heat & Frost Insulator (Second Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 60% of Journeyman's rate

Heat & Frost Insulator (Third Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 70% of Journeyman's rate

Heat & Frost Insulator (Fourth Year)

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 80% of Journeyman'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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$21.17**

Supplemental Benefit Rate per Hour: **\$17.33**

House Wrecker - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$22.32**

Supplemental Benefit Rate per Hour: **\$17.33**

House Wrecker - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$23.97**

Supplemental Benefit Rate per Hour: **\$17.33**

House Wrecker - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: **\$26.53**

Supplemental Benefit Rate per Hour: **\$17.33**

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Iron Worker (Ornamental) - 1st Ten Months

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: **\$36.50**

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Iron Worker (Ornamental) - 11 -16 Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$37.62

Iron Worker (Ornamental) - 17 - 22 Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$38.73

Iron Worker (Ornamental) - 23 - 28 Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$40.97

Iron Worker (Ornamental) - 29 - 36 Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$43.20

(Local #580)

IRON WORKER - STRUCTURAL
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Iron Worker (Structural) - 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$25.48
Supplemental Benefit Rate per Hour: \$46.83

Iron Worker (Structural) - 7- 18 Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$26.08
Supplemental Benefit Rate per Hour: \$46.83

Iron Worker (Structural) - 19 - 36 months

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Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$26.68

Supplemental Benefit Rate per Hour: \$46.83

(Local #40 and #361)

**LABORER (FOUNDATION, CONCRETE, EXCAVATING, STREET PIPE
LAYER & COMMON)**

(Ratio Apprentice to Journeyman: 1 to 1, 1 to 3)

**Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - First
1000 hours**

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyman's rate

Supplemental Rate Per Hour: \$36.53

**Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) -
Second 1000 hours**

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 60% of Journeyman's rate

Supplemental Rate Per Hour: \$36.53

**Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) -
Third 1000 hours**

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 75% of Journeyman's rate

Supplemental Rate Per Hour: \$36.53

**Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) -
Fourth 1000 hours**

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 90% of Journeyman's rate

Supplemental Rate Per Hour: \$36.53

(Local #731)

MARBLE MECHANICS

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cutters & Setters - First 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Cutters & Setters - Third 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Cutters & Setters - Fourth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Cutters & Setters - Fifth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Cutters & Setters - Sixth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 95% of Journeyperson's rate

Polishers & Finishers - First 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

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Polishers & Finishers - Third 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Polishers & Finishers - Fourth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$21.39

Supplemental Benefit Rate per Hour: \$18.44

Mason Tender - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$22.54

Supplemental Benefit Rate per Hour: \$18.44

Mason Tender - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$24.29

Supplemental Benefit Rate per Hour: \$18.49

Mason Tender - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$26.95

Supplemental Benefit Rate per Hour: \$18.49

(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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$29.41

Supplemental Benefit Rate per Hour: \$22.89

Metallic Lather (Second Year - Called Prior to 6/29/11)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$34.01

Supplemental Benefit Rate per Hour: \$24.54

Metallic Lather (Third Year - Called Prior to 6/29/11)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$39.07

Supplemental Benefit Rate per Hour: \$25.69

Metallic Lather (First Year -Called On Or After 6/29/11)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$23.01

Supplemental Benefit Rate per Hour: \$17.95

Metallic Lather (Second Year - Called On Or After 6/29/11)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$28.11

Supplemental Benefit Rate per Hour: \$17.95

Metallic Lather (Third Year - Called On Or After 6/29/11)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$33.21

Supplemental Benefit Rate per Hour: \$17.95

(Local #46)

MILLWRIGHT

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Millwright (First Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$27.23

Supplemental Benefit Rate per Hour: \$34.06

Millwright (Second Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$32.18

Supplemental Benefit Rate per Hour: \$37.62

Millwright (Third Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$37.13

Supplemental Benefit Rate per Hour: \$41.83

Millwright (Fourth Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$47.03

Supplemental Benefit Rate per Hour: \$48.31

(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: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$27.05

Supplemental Benefit Rate per Hour: \$17.12

Paver and Roadbuilder - Second Year (Minimum 1000 hours)

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Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$28.69

Supplemental Benefit Rate per Hour: \$17.12

(Local #1010)

PAINTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Brush & Roller - First Year

Effective Period: 7/1/2015 - 10/31/2015

Wage Rate per Hour: \$15.80

Supplemental Benefit Rate per Hour: \$11.88

Effective Period: 11/1/2015 - 6/30/2016

Wage Rate per Hour: \$16.40

Supplemental Benefit Rate per Hour: \$12.13

Painter - Brush & Roller - Second Year

Effective Period: 7/1/2015 - 10/31/2015

Wage Rate per Hour: \$19.75

Supplemental Benefit Rate per Hour: \$15.73

Effective Period: 11/1/2015 - 6/30/2016

Wage Rate per Hour: \$20.50

Supplemental Benefit Rate per Hour: \$15.98

Painter - Brush & Roller - Third Year

Effective Period: 7/1/2015 - 10/31/2015

Wage Rate per Hour: \$23.70

Supplemental Benefit Rate per Hour: \$18.64

Effective Period: 11/1/2015 - 6/30/2016

Wage Rate per Hour: \$24.60

Supplemental Benefit Rate per Hour: \$18.89

Painter - Brush & Roller - Fourth Year

Effective Period: 7/1/2015 - 10/31/2015

Wage Rate per Hour: \$31.60

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Supplemental Benefit Rate per Hour: \$24.02

Effective Period: 11/1/2015 - 6/30/2016

Wage Rate per Hour: \$32.80

Supplemental Benefit Rate per Hour: \$24.27

(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: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Painters - Structural Steel (Second Year)

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Painters - Structural Steel (Third Year)

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Rate Per Hour: \$15.76

Plasterer - First Year: 2nd Six Months

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Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: \$16.24

Plasterer - Second Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$18.21

Plasterer - Second Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$19.29

Plasterer - Third Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$21.46

Plasterer - Third Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: \$22.54

(Local #530)

PLUMBER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plumber - First Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$14.00
Supplemental Benefit Rate per Hour: \$0.71

Plumber - First Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate per Hour: \$14.00

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$2.96

Plumber - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$23.87

Supplemental Benefit Rate per Hour: \$12.76

Plumber - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$25.97

Supplemental Benefit Rate per Hour: \$12.76

Plumber - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$28.82

Supplemental Benefit Rate per Hour: \$12.76

Plumber - Fifth Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$30.22

Supplemental Benefit Rate per Hour: \$12.76

Plumber - Fifth Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$42.29

Supplemental Benefit Rate per Hour: \$12.76

(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

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$25.01

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$4.75

Pointer - Waterproofer, Caulker Mechanic - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$27.25

Supplemental Benefit Rate per Hour: \$9.70

Pointer - Waterproofer, Caulker Mechanic - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$32.24

Supplemental Benefit Rate per Hour: \$12.45

Pointer - Waterproofer, Caulker Mechanic - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate per Hour: \$38.66

Supplemental Benefit Rate per Hour: \$12.45

(Bricklayer District Council)

ROOFER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Roofer - First Year

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 35% of Journeyperson's Rate

Roofer - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's Rate

Roofer - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's Rate

Roofer - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

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 (0-6 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 25% of Journeyperson's rate

Supplemental Rate Per Hour: \$6.24

Sheet Metal Worker (7-18 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 35% of Journeyperson's rate

Supplemental Rate Per Hour: \$16.71

Sheet Metal Worker (19-30 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 45% of Journeyperson's rate

Supplemental Rate Per Hour: \$23.00

Sheet Metal Worker (31-36 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 55% of Journeyperson's rate

Supplemental Rate Per Hour: \$27.02

Sheet Metal Worker (37-42 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 60% of Journeyperson's rate

Supplemental Rate Per Hour: \$29.06

Sheet Metal Worker (43-48 Months)

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 70% of Journeyperson's rate

Supplemental Rate Per Hour: \$33.10

Sheet Metal Worker (49-54 Months)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
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Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 75% of Journeyman's rate
Supplemental Rate Per Hour: \$35.12

Sheet Metal Worker (55-60 Months)

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Rate Per Hour: \$37.15

(Local #28)

SIGN ERECTOR

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Sign Erector - First Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 35% of Journeyman's rate
Supplemental Rate Per Hour: \$13.18

Sign Erector - First Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 40% of Journeyman's rate
Supplemental Rate Per Hour: \$14.95

Sign Erector - Second Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 45% of Journeyman's rate
Supplemental Rate Per Hour: \$16.74

Sign Erector - Second Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 50% of Journeyman's rate
Supplemental Rate Per Hour: \$18.52

Sign Erector - Third Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 55% of Journeyman's rate
Supplemental Rate Per Hour: \$24.94

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Sign Erector - Third Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 60% of Journeyman's rate
Supplemental Rate Per Hour: \$26.87

Sign Erector - Fourth Year: 1st Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Rate Per Hour: \$29.47

Sign Erector - Fourth Year: 2nd Six Months

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Rate Per Hour: \$31.46

Sign Erector - Fifth Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 75% of Journeyman's rate
Supplemental Rate Per Hour: \$33.43

Sign Erector - Sixth Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Rate Per Hour: \$35.41

(Local #137)

STEAMFITTER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Steamfitter - First Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate and Supplemental Per Hour: 40% of Journeyman's rate

Steamfitter - Second Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate and Supplemental Rate Per Hour: 50% of Journeyman's rate.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Steamfitter - Third Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate and Supplemental Rate per Hour: 65% of Journeyperson's rate.

Steamfitter - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate and Supplemental Rate Per Hour: 80% of Journeyperson's rate.

Steamfitter - Fifth Year

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Second 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016
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: 7/1/2015 - 6/30/2016
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: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Drywall Taper - Second Year

Effective Period: 7/1/2015 - 6/30/2016
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Drywall Taper - Third Year

Effective Period: 7/1/2015 - 6/30/2016
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: 7/1/2015 - 6/30/2016

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Tile Layer - Setter - Second 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Tile Layer - Setter - Third 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Tile Layer - Setter - Fourth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Tile Layer - Setter - Fifth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Tile Layer - Setter - Sixth 750 Hours

Effective Period: 7/1/2015 - 6/30/2016

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: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Rate Per Hour: \$31.54

Timberperson - Second Year

Effective Period: 7/1/2015 - 6/30/2016

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$31.54

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Timberperson - Third Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$31.54

Timberperson - Fourth Year

Effective Period: 7/1/2015 - 6/30/2016
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$31.54

(Local #1536)







NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

June 01, 201

**DDC STANDARD GENERAL CONDITIONS
FOR SINGLE CONTRACT PROJECTS**

June 01, 2013



NEW YORK CITY DEPARTMENT OF
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No Text



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Issue Date - June 01, 2013
Revised - January 15, 2015

DDC STANDARD GENERAL CONDITIONS FOR SINGLE CONTRACT PROJECTS



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**DIVISION 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS
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NEW YORK CITY DEPARTMENT OF
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Division 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
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SECTION 01 10 00 SUMMARY

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].
- B. Addendum to the General Conditions: These General Conditions include and are supplemented by the Addendum to the General Conditions (the "Addendum"). The Addendum includes the following: (1) schedules referred to in these General Conditions (Schedule A through F), (2) information regarding the applicability of various articles, and (3) amended articles, if any.

1.2 SUMMARY:

- A. This section includes the following:
 - 1. Scope and Intent
 - 2. Provisions Referenced in the Contract
 - 3. Performance of Work During Non-Regular Work Hours (Pursuant to a Change Order)
 - 4. Interruption of Services at Existing Facilities

1.3 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 SCOPE AND INTENT:

- A. Description of Project: Refer to the Addendum for a description of the project.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 B

- B. LEED: The City of New York will seek U.S. Green Building Council (USGBC) LEED (Leadership in Energy and Environmental Design) certification for this Project as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS" and the Addendum to the General Conditions.



REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.2 C

- C. **COMMISSIONING:** The project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning shall be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS, and the Addendum to the General Conditions. The Contractor shall cooperate with the commissioning agent and provide whatever assistance is required.
- D. **PROGRESS SCHEDULE:** Refer to Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION for requirements of the project.
- E. **COMPLETION OF WORK:** Work to be done under the Contract is comprised of the furnishing of all labor, materials, equipment and other appurtenances, and obtaining all regulatory agency approvals necessary and required to complete the construction work in accordance with the Contract.
- F. **OMISSION OF DETAILS:** All work called for in the Specifications applicable to the Contract but not shown on the Contract Drawings in their present form, or vice versa, is required, and shall be performed by the Contractor as though it were originally delineated or described. The cost of such work shall be deemed included in the total Contract Price.
- G. **WORK NOT IN SPECIFICATIONS OR CONTRACT DRAWINGS:** Work not particularly specified in the Specifications nor detailed on the Contract Drawings but involved in carrying out their intent or in the complete and proper execution of the work, is required, and shall be performed by the Contractor. The cost of such work shall be deemed included in the total Contract Price.
- H. **SILENCE OF THE SPECIFICATIONS:** The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, 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.
- I. **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 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.

1.5 CONTRACT DRAWINGS AND SPECIFICATIONS:

- A. **SCHEDULE C -** The Contract Drawings are listed in Schedule C, which is set forth in the Addendum. Such drawings referred to in the Contract, and in the applicable Specifications for the Contract, bear the general title:

City of New York
Department of Design and Construction
Division of Public Buildings
- B. **DOCUMENTS FURNISHED TO THE CONTRACTOR -** After the award of the Contract, the Contractor will be furnished with five (5) complete sets of paper prints of all Contract Drawings mentioned in Paragraph A above, as well as a copy of the Specifications.
- C. **ADDITIONAL COPIES** of Drawings and Specifications, when requested, will be furnished to the Contractor if available.



- D. **SUPPLEMENTARY DRAWINGS** - When, in the opinion of the Commissioner, it becomes necessary to more fully explain the work to be done, or to illustrate the work further, or to show any changes which may be required, drawings known as Supplementary Drawings will be prepared by the Commissioner.
- E. **COMPENSATION** - Where Supplementary Drawings entail extra work, compensation therefore to the Contractor 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.
- F. **SUPPLEMENTARY DRAWING PRINTS** - Three (3) copies of prints of these Supplementary Drawings will be furnished to the Contractor.
- G. **COPIES TO SUBCONTRACTORS** - The Contractor 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.

1.6 COORDINATION:

- A. **COORDINATION AND COOPERATION** - The Contractor shall consult and study the requirements of the Contract Drawings and Specifications for all required work, including all work to be performed by trade subcontractors, so that the Contractor may become acquainted with the work of the project as a whole in order to achieve the proper coordination and cooperation necessary for the efficient and timely performance of the work.
- B. **CONTRACTOR TO CHECK DRAWINGS** - The Contractor 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.

1.7 SHOP DRAWINGS AND RECORD DRAWINGS:

Refer to Division I Section 01 33 00 - SUBMITAL PROCEDURES and Section 01 78 39 - PROJECT RECORD DRAWINGS for requirements applicable to shop drawings and record drawings.

1.8 TEMPORARY FACILITIES, SERVICES AND CONTROLS:

Refer to Division I Section 01 50 00 - TEMPORARY FACILITIES SERVICES AND CONTROLS for the responsibilities of the Contractor.

1.9 DUST CONTROL:

The Contractor shall prepare, execute and manage a "Dust Control Plan" for the prevention of the emission of dust from construction related activities in compliance with 15 RCNY 13-01 et. seq.

1.10 PROVISIONS REFERENCED IN THE CONTRACT:

- A. **SCHEDULE A** - Various Articles of the Contract refer to requirements set forth in Schedule A of the General Conditions. Schedule A, which is included in the Addendum, sets forth (1) the referenced Articles of the Contract, and (2) the specific requirements applicable to the Contract.



- B. EXTENSION OF TIME - Applications for Extensions of Time, as indicated in Article 13 of the Contract, 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 therefore.

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 Documents, the Contractor shall remove and replace, at Contractor's own cost, such defective or improperly incorporated material with materials complying with the Contract Documents. Until such materials are replaced, the City will deduct from the value of the stored materials or from any other money due 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 therefore from the Comptroller. Failure on the part of the Contractor to submit satisfactory evidence that all such materials have been paid for in full, 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. **MOBILIZATION PAYMENT** – A line item for mobilization shall be allowed on the Contractor's Detailed Bid 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 Bid Breakdown 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	x	= \$ 6,000
\$ 100,001 - \$ 500,000	x 6	= \$ 6,000 (min) - \$ 30,000 (max)
\$ 500,000 - \$ 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.

- E. **ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING:** The Contractor shall submit reports to the Commissioner regarding the use of Ultra Low Sulfur Diesel Fuel in Non-Road Vehicles, and the implementation of Best Available Technology (BAT), as set forth in Article 5.4 of the Contract. Such reports shall be submitted in accordance with the schedule, format, directions and procedures established by the Commissioner.



1.11 PERFORMANCE OF WORK DURING NON-REGULAR WORK HOURS:

- A. **NON-REGULAR WORK HOURS:** The Commissioner may issue a change order in accordance with Article 25 of the Contract which (1) directs the Contractor to perform the Work, or specific components thereof, during other than regular work hours (i.e., evenings, weekends and holidays), and (2) provides compensation to the Contractor for costs in connection with the performance of Work during other than regular work hours. The Commissioner may issue a change order if a delay has occurred and such delay is not the fault of the Contractor, or if the work is of such an important nature that delay in completing such work would result in serious disadvantage to the public.
- B. **PROCEDURE:** The Contractor shall (1) obtain whatever permits may be required for performance of the work during other than regular business hours, and (2) pay all necessary fees in connection with such permits. In addition, if directed by the Commissioner, the Contractor shall make immediate application to the Commissioner of the Department of Labor, State of New York, for dispensation in accordance with Subdivision 2 of Section 220 of the Labor Law.

1.12 INTERRUPTION OF SERVICES AT EXISTING FACILITIES:

- A. **EVENING AND WEEKEND WORK** - Where performance of the Work requires the temporary shutdown(s) of services, such shutdown(s) shall be made at night or on weekends or at such times that will cause no interference with the established routines and operations of the facility in question.
 - 1 Where weekend or evening work is required due to unavoidable service shutdowns, such work shall be performed at no extra cost to the City. Components of the Work that must be performed during other than regular work hours are indicated in the Drawings and/or the Specifications.
- B. **INTERRUPTION OF EXISTING FACILITIES:**
 - 1 The Contractor shall not interrupt any of the services of the facility nor interfere with such services in any way without the permission of the Commissioner. Such interruption or interferences shall be made as brief as possible, and only at such time stated.
 - 2 Under no circumstances shall the Contractor, its subcontractors, or its workers, be permitted to use any part of the project as a shop, without the permission of the Commissioner.
 - 3 Unnecessary noise shall be avoided at all times and necessary noise shall be reduced to a minimum.
 - 4 Toilet facilities, water and electricity must be operational at all times (i.e. 24/7). No services of the facility can be interrupted in any way without the permission of the Commissioner. Careful coordination of all work with the Resident Engineer must be done to maintain the operational level of the project personnel at the facility.
 - 5 The Contractor shall schedule the work to avoid noise interference that will affect the normal functions of the facility. In particular, construction operations producing noises that are objectionable to the functions of the facility must be scheduled at times of day or night, day of the week, or weekend, which will not interfere with personnel at the facility. Any additional cost resulting from this scheduling shall be borne by the Contractor.



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- 6 The Contractor shall arrange to work continuously, including evening and weekend hours, if required, to assure that services will be shut down only during the time actually required to make the necessary connections to the existing facility.
- 7 The Contractor shall give ample written notice in advance to the Commissioner and personnel at the facility of any required shutdown.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 10 00



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SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].
- B. LEED: Refer to the Addendum to identify whether this project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS."
- C. COMMISSIONING: Refer to the Addendum to identify whether this project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning shall be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS. The Contractor shall cooperate with the commissioning agent and provide whatever assistance is required.

1.2 SUMMARY:

- A. This Section includes administrative provisions for coordinating construction operations on the Project including without limitation the following.
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. This section includes the following:
 - 1. Definitions
 - 2. Coordination
 - 3. Submittals
 - 4. Administrative and Supervisory Personnel
 - 5. Project Meetings
 - 6. Requests for Interpretation (RFI's)
 - 7. Correspondence
 - 8. Contractor's Daily Reports
 - 9. Alternate and Substitute Equipment
- C. RELATED SECTIONS: include without limitation the following:
 - 1. Section 01 10 00 SUMMARY
 - 2. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
 - 3. Section 01 33 00 SUBMITTALS
 - 4. Section 01 35 26 SAFETY REQUIREMENTS
 - 5. Section 01 73 00 EXECUTION REQUIREMENTS
 - 6. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL



7. Section 01 77 00 PROJECT CLOSEOUT PROCEDURES

1.3 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 COORDINATION:

- A. Coordination: The Contractor shall coordinate its construction operations, including those of its subcontractors, with other entities to ensure the efficient and orderly installation of each part of the Work. The Contractor shall coordinate the various operations required by different Sections of the Specifications that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence in order to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. The Contractor shall prepare memoranda for distribution to its subcontractors and other involved entities, outlining special procedures required for coordination. Such memoranda shall include required notices, reports, and meeting minutes as applicable.
- C. Administrative Procedures: The Contractor shall coordinate scheduling and timing of required administrative procedures with other construction activities and activities of its subcontractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include without limitation the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Installation and removal of temporary facilities and controls.
 - 3. Delivery and processing of submittals.
 - 4. Progress meetings.
 - 5. Pre-installation conferences.
 - 6. Startup and adjustment of systems.
 - 7. Project closeout activities.
- D. Conservation: The Contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.



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- E. Salvaged Items, Material and/or Equipment: The Specifications may identify certain items, materials or equipment which must be salvaged by the Contractor and handled or disposed of as directed. The Contractor shall comply with all directions in the Specifications regarding the salvaging and handling of identified items, material or equipment.

1.5 SUBMITTALS:

- A. Submit shop drawings, product data, samples etc. in compliance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Coordination Drawings: The Contractor shall prepare applicable Coordination Drawings in compliance with the requirements for Coordination Drawings in Section 01 33 00, SUBMITTAL PROCEDURES.
- C. Safety Plan in compliance with Section 01 35 26, SAFETY REQUIREMENTS PROCEDURES.
- D. Waste Management Plan in compliance with Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
- E. Key Personnel Names: Within 15 days after the Notice to Proceed, the Contractor shall submit a list of key personnel assignments of the Contractor and its subcontractors, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in case of the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.
 2. In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work. Include special personnel required for coordinating all operations by its subcontractors.

1.6 PROJECT MEETINGS:

- A. General: The Resident Engineer will hold regularly scheduled construction progress meetings at the site, at which time the Contractor and appropriate subcontractors shall have their representatives present to discuss all details relative to the execution of the work. The Resident Engineer shall preside over these meetings.
1. Agenda: 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 the Contractor will then dictate a brief statement for the record.
 2. Coordination: In addition to construction progress meetings called by the Resident Engineer, the Contractor shall hold regularly scheduled meetings for the purpose of coordinating; expediting and scheduling the work in accordance with the master coordinated Job Progress Chart. The Contractor and its subcontractors, material suppliers or vendors whose presence is necessary, are required to attend. These meetings may, at the discretion of the Contractor, be held at the same place and immediately following the project meetings held by the Resident Engineer. Minutes of these meetings shall be recorded, typed and printed by the Contractor and distributed to all parties concerned.
- B. PRECONSTRUCTION KICK-OFF MEETING:
1. The Resident Engineer will schedule a preconstruction kick-off meeting either at DDC's main office or at the Project site to review responsibilities and personnel assignments and clarify the



- role of each participant. Unless otherwise directed the Design Consultant will record and distribute meeting minutes.
2. Attendees: Authorized representative of the Client Agency; Design Consultant; the Contractor and its superintendents, subcontractor(s) and their superintendent(s); LEED sub-consultant and Commissioning Authority /Agent (CxA) as applicable and other concerned parties. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Contract Work.
 3. Agenda: Includes without limitation the following as applicable:
 - a. Establishing construction schedule
 - b. Schedule for regular construction meetings
 - c. Phasing
 - d. Critical work sequencing and long-lead items
 - e. Designation of key personnel and their duties
 - f. Reviewing Application for Payment and Change Order Procedures
 - g. Procedures for Requests for Information (RFIs.)
 - h. Review Permits and Approval requirements
 - i. Review all recent Administrative Code reporting requirements relating to the project, (i.e. LL 77, LL86 etc.)
 - j. Procedures for testing and inspecting
 - k. Reviewing special conditions at the Project site
 - l. Distribution of the Contract Documents
 - m. Submittal procedures
 - n. Safety Procedures
 - o. LEED requirements
 - p. Commissioning Requirements
 - q. Preparation of Record Documents
 - r. Historic Treatment requirements
 - s. Use of the premises
 - t. Work restrictions
 - u. Client Agency occupancy requirements
 - v. Responsibility for temporary facilities, services and controls
 - w. Construction Waste Management and Disposal
 - x. Indoor Air Quality Management Plan
 - y. Dust Mitigation Plan
 - z. Office, work, and storage areas
 - aa. Equipment deliveries and priorities
 - bb. Security
 - cc. Progress cleaning
 - dd. Working hours



C. CONSTRUCTION PROGRESS MEETINGS:

1. The Resident Engineer will schedule and conduct construction progress meetings at bi-weekly intervals or as otherwise determined. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work. Unless otherwise directed the Design Consultant will record and distribute meeting minutes.
2. Attendees:
 - a. Design Consultant and applicable sub-consultants
 - b. Client Agency Representative
 - c. Representatives from the Contractor, sub-contractor(s), suppliers or other entities involved in the current progress, planning, coordination or future activities of the Work
 - d. Other appropriate DDC personnel, DDC consultants and concerned parties
3. Agenda: Includes without limitation the following:
 - a. Review the Construction Schedule and progress of the Work. Determine if the Work is on time, ahead of schedule or behind schedule. Determine actions to be taken to maintain or accelerate the schedule
 - b. Review and approve prior meeting minutes and follow up open issues
 - c. Coordinate work between each subcontractor
 - d. Sequence of Operations
 - e. Status of submittals, deliveries and off-site fabrication
 - f. Status of inspections and approvals by governing agencies
 - g. Temporary facilities and controls
 - h. Review Site Safety
 - i. Quality and work standards
 - j. Field observations
 - k. Status of correction of deficient items
 - l. RFI's
 - m. Pending changes
 - n. Status of outstanding Payments and Change Orders
 - o. LEED requirements including Construction Waste Management, Indoor Air Quality Plan, Dust Mitigation and Commissioning
 - p. Status of Administrative Code reporting requirements related to the project

1.7 REQUESTS FOR INFORMATION (RFI):

- A. Procedure: Immediately on discovery of the need for information or interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, the Contractor shall prepare and submit an RFI in the form specified by the Resident Engineer.
 1. RFI shall originate with the Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFI in a prompt manner to the Resident Engineer so as to avoid delays in Contractor's work or work of its subcontractors.
 3. RFI Log: The Contractor shall prepare, maintain, and submit a tabular log of RFIs organized by the RFI number monthly to the Resident Engineer.



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4. On receipt of responses and action to the RFI, the Contractor shall update the RFI log and immediately distribute the RFI response to affected parties. Review response(s) and notify the Resident Engineer immediately if the Contractor disagrees with response(s).

1.8 CORRESPONDENCE:

Copies of all correspondence to DDC shall be sent directly to the Resident Engineer at the job site.

1.9 CONTRACTOR'S DAILY REPORTS:

The Contractor shall prepare and submit Daily Construction Progress Reports as outlined in Section 01 32 00, CONSTRUCTION PROGRESS DOCUMENTATION.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 31 00



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SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for establishing an effective base line schedule for the project and documenting the progress of construction during performance of the Work by developing, revising as necessary, various documents including but not limited to the following:
1. Baseline Construction Schedule.
 2. Composite Schedule for entire project
 3. Recovery Composite Schedule
 4. Revised and/or updated Composite Schedule
 5. Submittals Schedule.
 6. Daily construction reports.
 7. Material location reports.
 8. Field condition reports.
 9. Special reports.
- B. RELATED SECTIONS: include without limitation the following:
1. Section 01 10 00 SUMMARY
 2. Section 01 32 22 PHOTOGRAPHIC DOCUMENTATION
 3. Section 01 33 00 SUBMITTAL PROCEDURES
 4. Section 01 40 00 QUALITY REQUIREMENTS

1.3 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.



C. Baseline Construction Schedule:

A horizontal bar chart type schedule (Microsoft Project OR similar program) listing all the activities and their duration for entire contract duration OR construction period, including logical ties and interrelations between the activities necessary for the timely and successful completion of the project. Critical path activities shall be clearly marked. The Baseline construction schedule is a preliminary schedule that must be reviewed and approved by the Resident Engineer.

D. Composite Schedule:

A composite horizontal bar chart type schedule (Microsoft Project OR similar program) listing all activities to be performed by the Contractor and its subcontractors, the duration of each activity including logical ties and interrelations between activities, and the sequence of each of necessary activities for the timely and successful completion of the project within the stipulated contract duration. Critical path activities shall be clearly marked. The Composite schedule must be signed and submitted by the Contractor within thirty (30) calendar days after the date established for commencement of the Contract, unless otherwise directed. The Composite Schedule must be reviewed and approved by the Resident Engineer.

E. Recovery Composite Schedule: A Recovery Composite Schedule is not required unless the City issues an Acceleration Change Order.

A Composite Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the project within the stipulated contract duration, plus authorized time extensions. In such case special attention must be given to keep the delays as minimum as possible and must establish the nature of efforts such as extended hours of work, weekend work, accelerated fabrication, required action(s) or effort(s) by the Contractor, its subcontractors, consultants, clients, end users and/or other concerned parties.

Such schedule must be prepared and submitted within Five (5) calendar days of request by the Resident Engineer. The Recovery Composite Schedule must be reviewed and approved by the Resident Engineer.

F. Revised and/or Updated Composite Schedule:

A Baseline construction schedule OR Composite Schedule OR Recovery Composite Schedule for the project that shows the actual duration of all the completed activities, including duration of and the reasons for delays, if any has occurred, AND revisions to all remaining activities of the Contractor and its subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined activities. Any such revisions should be shown on the row just below the approved schedule of the respective activity so that revisions can be compared.

The Revised and/or updated Composite Schedule must be reviewed and approved by the Resident Engineer.

G. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

H. Event: The starting or ending point of an activity.

I. Fragment: A part of the activity that breaks down activities into smaller activities for greater detail.

J. Milestone: A key or critical point in time for reference or measurement.

K. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.



PART II – PRODUCTS

2.1 BASELINE CONSTRUCTION SCHEDULE:

- A. The Contractor shall prepare a Baseline horizontal bar-chart-type construction schedule for the project. Submit the Baseline Construction Schedule to the Resident Engineer within (15) fifteen calendar days after the date established for commencement of the Contract, unless directed otherwise. The Baseline Schedule must be reviewed and approved by the Resident Engineer.
1. Provide a separate time bar for each significant construction activity. Coordinate each activity on the schedule with other construction activities for proper interrelationship & sequence.
 2. Duration: The duration of each activity on the schedule besides installation must clearly show required duration of filing for permits, inspections, testing, approvals, shop drawings and materials submittals and approvals, fabrication, delivery, phasing for each construction activity.
 3. Schedule shall be time-scaled in not more than weekly increments, with the dates of the first day (Monday) of each week indicated.
 4. Completion of all the project activities shall be indicated in advance of the date established for completion of the Contract, allowing time for required inspection and punch list work.
 5. Clearly show time bar for all the tasks, to be completed before start of physical work of scheduled activities, including but not limited to obtaining required permit, subcontractor approval, submission and approval of shop drawings, field verification, time for fabrication and delivery, testing of materials and/or samples, preparation and approval of mock-up sample, curing, pre-testing of soil, pre-testing of equipment - including start up, testing & adjusting, filing for inspection by regulatory agencies, training, final use, etc. required to maintain orderly progress of the activity. A special consideration must be given to those activities requiring early approvals because of long lead-time for manufacture or fabrication.
 6. Phasing: Arrange all activities in proper sequence to reflect requirements for phased completion, work by other entities, work by the City, City furnished items, coordination with existing work, limitations arising due to continued occupancies, non-interruptible services, partial completion for occupancy, site restrictions, provisions for future work, seasonal variations, environmental control, and similar conditions of the project.
 7. Arrange all activities and/or show interrelationship and logical sequence of all activities, determine and mark all critical path activities including any phasing reflecting actual project condition.
 8. Keep at least two blank horizontal bars between all activities for recording actual progress and submitting Revised Schedule as defined in Sub-Section 1.3 G
 9. If necessary a new revised schedule shall be prepared in the same manner as outlined above.

2.2 COMPOSITE SCHEDULE FOR THE PROJECT:

- A. The Contractor shall prepare a Composite Schedule based on the approved Baseline Schedule. Such schedule shall indicate graphically and chronologically the start and completion of each and every activity, including all the pre-activity and post activity tasks. Keep at least two blank horizontal bars between all activities for recording actual progress and/or revisions.
1. If necessary the Contractors shall meet with each subcontractor and with the Resident Engineer to review and make warranted adjustments and finalize the Composite Schedule. Once the schedule is finalized, the Contractor shall sign and date a reproducible form of the Composite Schedule. The Composite Schedule must be finalized and signed by the Contractor within (30) thirty calendar days after the date established for commencement of the Contract, unless directed otherwise. The Composite Schedule must be reviewed and approved by the Resident Engineer.



2.3 RECOVERY COMPOSITE SCHEDULE:

- A. A Recovery Composite Schedule is not required unless the City issues an Acceleration Change Order. A Recovery Composite Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the project within the stipulated contract duration, plus authorized time extensions, must be developed and submitted within (5) five calendar days of the request by the Resident Engineer. Such Recovery Composite Schedule shall include all information as defined in Article 1.3 F and shall be prepared in the same manner as outlined in Sub-Sections 2.1 and 2.2. The Recovery Composite Schedule must be reviewed and approved by the Resident Engineer.

2.4 REVISED AND/OR UPDATED COMPOSITE SCHEDULE:

- A. The Contractor shall revise and/or update the approved Composite Schedule as directed. The Revised schedule shall be prepared in the same manner as outlined above in Sub-Sections 2.1 and 2.2.
- B. The Contractor shall mark actual progress, delays, work stoppage etc. in the row just below the approved schedule for the respective activity so that revisions can be compared.
- C. Such schedule also shall indicate graphically and chronologically any revisions to the start and completion of the remaining activities including revisions to all the pre-activity and post activity tasks for all subcontractors.
- D. If necessary, the Contractor shall meet with each subcontractor and with the Resident Engineer to review and make warranted adjustments and finalize the Revised Composite Schedule. Once the schedule is finalized, the Contractor shall sign and date a reproducible form of the Schedule. Such schedule must be prepared and submitted by the Contractor within Five (5) calendar days of request by the Resident Engineer. The Revised Composite Schedule must be reviewed and approved by the Resident Engineer.

2.5 SUBMITTALS SCHEDULE:

- A. Preparation: The Contractor shall submit a schedule of submittals, arranged in chronological order by dates required by the construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
- B. SCHEDULE F: Schedule F sets forth all submittal requirements for shop drawings and material samples. Schedule F is included in the Addendum. At the kick-off meeting, the Contractor must review this Schedule with the Resident Engineer and the Design 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 business 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 business 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.
- C. Review: The Resident Engineer will review the Schedule F submitted by Contractor. Upon acceptance, the Resident Engineer will date and sign the schedule as approved and transmit it to the Consultant, Contractor and others within DDC as he/she deems appropriate.



2.6 REPORTS:

- A. Daily Construction Reports: The Contractor shall submit to the Resident Engineer written Daily Construction Reports at the end of each work day, recording basic information such as the date, day, weather conditions, and contract days passed, remaining contract duration/days and the following information concerning the Project.

Information: The reports shall be prepared by the Contractor's Superintendent and shall bear the Contractor's Superintendents signature. Each report shall contain the following information:

1. List of name of Contractor, subcontractors, their work force in each category, and details of activities performed.
2. The type of materials and/or major equipment being installed by the Contractor and/or by each subcontractor.
3. The major construction equipment being used by the Contractor and/or subcontractors.
4. Material and Equipment deliveries.
5. High and low temperatures and general weather conditions.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events.
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings
11. Emergency procedures.
12. Orders and/or requests of authorities having jurisdiction.
13. Approved Change Orders received and implemented.
14. Field Orders and Directives received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.
17. Partial Completions and occupancies.
18. Substantial Completions authorized.

NOTE: If there is NO ACTIVITY at site, a daily report indicating so and the reason for no activity at the site must be submitted.

- B. Material Location Reports: The contractor shall submit a Material Location Report at weekly OR monthly intervals as determined and established by the Resident Engineer. Such report shall include a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit a Request For Information (RFI) form with a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.7 SPECIAL REPORTS:

- A. Accident report, incident report, special condition report for the conditions out of control of any party involved with the project effecting project progress, explaining impact on the project schedule and cost if any.

PART III – EXECUTION (Not Used)
END OF SECTION 01 32 00



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No Text



SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 33

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.2 SUMMARY:

- A. This Section includes the following:
1. Photographic Media
 2. Construction Photographs
 3. Pre-construction Photographs
 4. Periodic Construction Progress Photographs
 5. Special Photographs
 6. DVD Recordings
 7. Final Completion Construction Photographs
- B. RELATED SECTIONS: include without limitation the following:
1. Section 01 10 00 SUMMARY
 2. Section 01 33 00 SUBMITTAL PROCEDURES
 3. Section 01 35 91 HISTORIC TREATMENT PROCEDURES
 4. Section 01 78 39 CONTRACT RECORD DOCUMENTS
 5. Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS
- C. PHOTOGRAPHER - The Contractor shall employ and pay for the services of a professional photographer who shall take photographs showing the progress of the work for all Contracts.

1.3 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 SUBMITTALS:

- A. Qualification Data: For photographer.



- B. Key Plan: With each Progress Photograph Submittal include a key plan of Project site and building with notation of vantage points marked for location and direction of each image. Indicate location, elevation or story of construction. Include same label information as corresponding set of photographs.
- C. Construction Progress Photograph Prints: Take Progress Photographs bi-weekly and submit four color prints of each photographic view for each trade to the Resident Engineer. Such photographs shall be included in each monthly progress report or as otherwise directed by the Resident Engineer.
- D. Construction Photograph Negatives: Submit a complete set of photographic negatives in individually protected negative sleeves with each submittal of prints. Identify negatives with label matching photographic prints.
- E. Digital Images: If Digital Media is used, submit a complete set of digital color image electronic files on CD-ROM with each submittal of prints. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, un-cropped.

1.5 QUALITY ASSURANCE:

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.6 COORDINATION:

- A. The Contractor and its subcontractor(s) shall cooperate with the photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.7 COPYRIGHT:

- A. The Contractor shall include the provisions set forth below in the agreement between the Contractor and the Photographer who will provide the construction photographs described in this section. The Contractor shall submit to the Resident Engineer a copy of its agreement with the Photographer.
- B. Any photographs, images and/or other materials produced pursuant to this Agreement, and any and all drafts and/or other preliminary materials in any format related to such items produced pursuant to this Agreement, shall upon their creation become the exclusive property of the City.
- C. Any photographs, images and/or other materials provided pursuant to this Agreement ("Copyrightable Materials") shall be considered "work-made-for-hire" within the meaning and purview of Section 101 of the United States Copyright Act, 17 U.S.C. § 101, and the City shall be the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might exist. To the extent that the Copyrightable Materials do not qualify as "work-made-for-hire," the Photographer hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to the Copyrightable Materials to the City, free and clear of any liens, claims, or other encumbrances. The Photographer shall retain no copyright or intellectual property interest in the Copyrightable Materials. The Copyrightable Materials shall be used by the Photographer for no purpose other than in the performance of this Agreement without the prior written permission of the City. The Department may grant the Photographer a license to use the Copyrightable Materials on such terms as determined by the Department and set forth in the license.
- D. The Photographer acknowledges that the City may, in its sole discretion, register copyright in the Copyrightable Materials with the United States Copyright Office or any other government agency authorized to grant copyright registrations. The Photographer shall fully cooperate in this effort, and agrees to provide any and all documentation necessary to accomplish this.



- E. The Photographer represents and warrants that the Copyrightable Materials: (i) are wholly original material not published elsewhere (except for material that is in the public domain); (ii) do not violate any copyright Law; (iii) do not constitute defamation or invasion of the right of privacy or publicity; and (iv) are not an infringement, of any kind, of the rights of any third party. To the extent that the Copyrightable Materials incorporate any non-original material, the Photographer has obtained all necessary permissions and clearances, in writing, for the use of such non-original material under this Agreement, copies of which shall be provided to the City.

PART II – PRODUCTS

2.1 PHOTOGRAPHIC MEDIA:

- A. Photographic Film: Medium format, 2-1/4 by 2-1/4 inches (60 by 60 mm).
- B. Digital Images:
1. Construction Progress Images: Color images in JPEG format with minimum sensor size of 1.3 megapixels.
 2. Presentation Quality Images: Provide Color images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 with 8"x10" original capture at 300 dpi or greater.
- C. Prints:
1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte color prints on single-weight commercial-grade stock paper, with 1-inch wide margins and punched for standard 3-ring binder.
 2. Identification: On the front of each photograph affix a label in the margin with Project name and date photograph was taken. On the back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Project Contract I.D. Number.
 - b. Project Contract Name.
 - c. Name of Contractor. (and Subcontractor Trade Represented)
 - d. Subject of Image Taken.
 - e. Date and time photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction and other pertinent information.
 - g. Unique sequential identifier.
 - h. Name and address of photographer.

PART III – EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS:

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
1. Maintain key plan with each set of construction photographs that identifies each photographic location and direction of view.
- B. Film Images:
1. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.



2. Field Office Prints: Retain one set of prints of progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to Commissioner.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 1. Date and Time: Include date and time in filename for each image.
 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Commissioner.

3.2 PRE-CONSTRUCTION & PRE-DEMOLITION PHOTOGRAPHS:

- A. Before commencement of Contract work at the site, take color photographs of Project site and surrounding properties, including existing structures or items to remain during construction, from different vantage points, as directed by the Resident Engineer.
 1. Flag applicable excavation areas and construction limits before taking construction photographs.
 2. Take photographs of minimum eight (8) views to show existing conditions adjacent to property before starting the Work.
 3. Take applicable photographs of minimum eight (8) views of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 4. Take additional photographs as required or directed by the Resident Engineer to record settlement or cracking of adjacent structures, pavements, and improvements.
- B. Demolition Operations: Take photographs as directed by the Resident Engineer of minimum of eight (8) views each before commencement of demolition operations, at mid-point of operations and at completion of operations.
- C. Pre-Demolition Photographs: Take archival quality color photographs, to include all exterior building facades, of all structures at the Project site designated to be fully demolished or removed in compliance with NYC Building Code requirements. Submit four (4) complete sets of pre-demolition photographs, in the format specified herein, to the Resident Engineer for submission to the Department of Buildings.

3.3 PERIODIC CONSTRUCTION PROGRESS PHOTOGRAPHS:

- A. Take photographs of minimum eight (8) views bi-weekly as directed by the Resident Engineer of construction progress for each contract trade. Select vantage points to show status of construction and progress since last photographs were taken.

3.4 SPECIAL PHOTOGRAPHS:

- A. The photographer shall take special photographs of subject matter or events as specified in other sections of the Project Specifications from vantage points specified or as otherwise directed by the Resident Engineer.
- B. Historical Elements: As required in Section 01 35 91, HISTORIC TREATMENT PROCEDURES, for Contract work at designated landmark structures or sites the photographer, as specified and required by individual sections of the Contract documents or at the direction of the Commissioner, shall take images of existing elements scheduled to be removed for replacement, repair or replication in quantities as directed, including post-construction photographs of completed work as directed by the Commissioner.



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1. Take Presentation Quality Photographs of designated landmark structures as directed by the Commissioner for submission to the New York City Landmarks Preservation Commission. Provide a minimum of four color photographic prints of each view as directed.

3.5 DVD RECORDING:

- A. When DVD Recording of Demonstration and Training sessions is required for Non-Commissioned projects the Contractor shall provide the services of a Videographer as indicated in Section 01 79 00, DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

3.6 FINAL COMPLETION CONSTRUCTION PHOTOGRAPHS:

- A. Take color photographs of minimum eight (8) unobstructed views of the completed project or project 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 is done after date of Substantial Completion for submission as Project Record Documents. Submit four (4) sets of each view of Presentation Quality photographic prints including negatives and/or digital images electronic file.

END OF SECTION 01 32 33



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Revised - January 15, 2015

No Text



SECTION 01 33 00
SUBMITTAL PROCEDURES

PART I – GENERAL:

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Coordination Drawings, Catalogue Cuts, Material Samples and other submittals required by the Contract Documents.
- B. Review of submittals does not relieve the Contractor of responsibility for any Contractor's errors or omissions in such submittals, nor from responsibility for complying with the requirements of the Contract.
- C. Responsibility of the Contractor: The approval of Shop Drawings will be general and 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.
- D. This Section includes the following:
1. Definitions
 2. Submission Procedures
 3. Coordination Drawings
 4. LEED Submittals
 5. Ultra Low Sulfur Diesel Fuel Reporting
 6. Construction Photographs and DVD Recordings
 7. As-Built Documents

1.3 RELATED SECTIONS: Include without limitation the following:

- | | | |
|----|------------------|--|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 31 00 | PROJECT MANAGEMENT AND COORDINATION |
| C. | Section 01 32 00 | CONSTRUCTION PROGRESS DOCUMENTATION |
| D. | Section 01 32 33 | PHOTOGRAPHIC DOCUMENTATION |
| E. | Section 01 77 00 | CLOSEOUT PROCEDURES |
| F. | Section 01 78 39 | CONTRACT RECORD DOCUMENTS |
| G. | Section 01 81 13 | SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS |

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or



combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

- C. **Submittals:** Written and graphic information that requires responsive actions and includes without limitation all shop drawings, product data, letters of certification, tests and other information required for quality control and as required by the Contract Documents.
- D. **Informational Submittals:** Written information that does not require responsive action. Submittals may be rejected for non-compliance with the Contract.
- E. **Shop Drawings:** Include drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, except for coordination drawings, specifically prepared for the project by the Contractor or any subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated and/or installed.
- F. **Coordination Drawings:** As required in Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.
- G. **Product Data and Quality Assurance Submittals:** Includes manufacturer's standard catalogs, pamphlets and other printed materials including without limitation the following:
 - 1. Catalogue and Product specifications
 - 2. Installation instructions
 - 3. Color charts
 - 4. Catalog cuts
 - 5. Rough-in diagrams and templates
 - 6. Wiring diagrams
 - 7. Performance curves
 - 8. Operational range diagrams
 - 9. Mill reports
 - 10. Design data and calculations
 - 11. Certification of compliance or conformance
 - 12. Manufacturer's instructions and field reports

1.5 COORDINATION DRAWINGS:

- A. The Contractor shall provide reproducible Coordination Drawing(s) of the reflective ceiling showing the integration of all applicable contract work, including general construction work as well as trade work (Plumbing, HVAC, and Electrical) to be performed by subcontractors. The Coordination Drawing(s) shall include, without limitation, the following information:
 - 1. General Construction work showing the reflective ceiling plan including starting points, ceiling and beam soffits elevations, ceiling heights, roof openings, etc.
 - 2. HVAC Contract work showing ductwork, heating and sprinkler piping, location of grilles, registers etc. and access doors in hung ceilings. Locations shall be fixed by elevations and dimensions from column centerlines and/or walls.
 - 3. Plumbing Contract work including piping, valves, cleanouts etc., indicating locations and elevations and shall indicate the necessary access doors.
 - 4. Electrical Contract work indicating fixtures, large conduit runs, clearances, pull boxes, junction boxes, sound system speakers, etc.
- B. The Contractor shall issue the completed Coordination Drawing(s) to the Resident Engineer for his/her review. The Resident Engineer may call as many meetings as necessary with the Contractor, including



attendance by applicable subcontractors, and may call on the services of the Design Consulting where necessary, to resolve any conflicts that become apparent.

- C. Upon resolution of any conflicts, the Contractor shall provide a final Coordination Drawing(s) which will become the Master Coordination Drawing(s). The Master Coordination Drawing(s) shall be signed and dated by the Contractor to indicate acceptance of the arrangement of the work.
- D. A reproducible copy of the Master Coordination Drawing(s) shall be provided by the Contractor to each of the appropriate subcontractor(s), the Resident Engineer and the Design Consultant for information.
- E. Shop Drawings shall not be submitted prior to acceptance of the final coordinated drawings and shall be prepared in accordance with the Master Coordination Drawing(s). No work will be permitted without accepted Shop Drawings. It is therefore essential that this procedure be instituted as quickly as possible.

1.6 SUBMITTAL PROCEDURES:

- A. Refer to Section 01 35 03 GENERAL MECHANICAL REQUIREMENTS and Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS for additional submittal requirements involving electrical and mechanical work or equipment of any nature called for the project.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activities, with the Submittal Schedule specified in Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - 3. The Commissioner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: The Submittals Schedule is set forth in Schedule F, which is included in the Addendum.
- D. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Design Consultant.
 - 3. Include the following minimum information on label for processing and recording action taken:
 - a. Project name, DDC Project Number and Contract Number
 - b. Date
 - c. Name and address of Design Consultant
 - d. Name and address of Contractor
 - e. Name and address of subcontractor
 - f. Name and address of supplier
 - g. Name of manufacturer
 - h. Submittal number or other unique identifier, including revision identifier
 - i. Number and title of appropriate Specification Section
 - j. Drawing number and detail references, as appropriate
 - k. Location(s) where product is to be installed, as appropriate
 - l. Other necessary identification
- E. Transmittal:
 - 1. Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form in triplicate. Transmittals received from sources other than the



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Contractor will be returned without review. Re-submission of the same drawings or product data shall bear the original number of the prior submission and the original titles.

2. Transmittal Form: Provide locations on form for the following information:

- a. Project name, DDC Project number and Contract Number
- b. Date
- c. Destination (To:)
- d. Source (From:)
- e. Names of Contractor, subcontractor, manufacturer, and supplier
- f. Category and type of submittal
- g. Submittal purpose and description
- h. Specification Section number and title
- i. Drawing number and detail references, as appropriate
- j. Transmittal number, numbered consecutively
- k. Submittal and transmittal distribution record
- l. Remarks
- m. Signature of transmitter

F. Shop Drawings:

1. Procedures for Preparing, Forwarding, Checking and Returning all Shop Drawings shall be, generally, as follows:

- a. The Contractor shall make available to its subcontractors the necessary Contract Documents and shall instruct such subcontractor to determine dimensions and conditions in the field, particularly with reference to coordination between the trade subcontractors. The Contractor shall direct its subcontractors to prepare Shop Drawings for submission to the Design Consultant 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:

1. Review and be responsible to the Commissioner, for information shown on its subcontractor's Shop and Installation drawings and manufacturers' data, and also for conformity to Contract Documents.
 2. "Ring Up" corrections made on all submissions for approval, so as to be readily seen, and that the symbol "GC", "PL", "HVAC" or "EL" be used to indicate that the correction and/or information added was made by the Contractor and/or its subcontractor(s).
 3. Clearly designate which entity is to perform the work when the term, "work by others" or other similar phrases are indicated on the Contract Drawings before submission to the Design Consultant.
 4. Stamp submissions "Recommended for Acceptance", date and forward to the Design Consultant.
2. The Contractor shall promptly prepare and submit project specific layout detail and Shop Drawings of such parts of the work as are indicated in the Specifications, Schedule F of the Addendum 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 be on sheets of the same size as the Contract Drawings, drawn accurately and of sufficient scale to be legible, with a one half (1/2) inch marginal space on each side and a two (2) inch marginal space for binding on the left side.



4. Scope of Drawings: Shop Drawings shall be numbered consecutively and shall accurately and distinctly represent all aspects of the work, including without limitation the following:
 - a. All working and erection dimensions
 - b. Arrangements and sectional views
 - c. Necessary details, including performance characteristics, and complete information for making necessary connections with other work
 - d. Kinds of materials including thickness and finishes
 - e. Identification of products
 - f. Fabrication and installation drawings
 - g. Roughing-in and setting diagrams
 - h. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
 - i. Shop work manufacturing instructions
 - j. Templates and patterns
 - k. Schedules
 - l. Design calculations
 - m. Compliance with specified standards
 - n. Notation of coordination requirements
 - o. Notation of dimensions established by field measurement
 - p. Relationship to adjoining construction clearly indicated
 - q. Seal and signature of professional engineer if specified
 - r. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring
 - s. All other information necessary for the work and/or required by the Commissioner.
5. Titles and Reference: Shop Drawings 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 and sequence at which materials, or equipment, are to be installed in the work
 - d. Cross references to the section number, detail number and paragraph number of the Contract Specifications
 - e. Cross references to the sheet number, detail number, etc., of the Contract Drawings
6. Field Measurements: In addition to the above requirements, the Shop Drawings shall be signed by the Contractor and, if applicable, the subcontractor responsible for preparation of the Shop Drawings. Each Shop Drawing shall be stamped with the following wording:

FIELD MEASUREMENTS: The Contractor certifies that it has verified and supplemented the Contract Drawings by taking all required field measurements, which said measurements correctly reflect all field conditions and that this Shop Drawing incorporates said measurements.
7. Contractor's Statement with Submittal: Any Submittal by the Contractor for acceptance, including without limitation, all dimensional drawings of equipment, blueprints, catalogues, models, samples and other data relative to the equipment, the materials, the work or any part thereof, must be accompanied by a statement that the Submittal has been examined by the Contractor and that everything shown in the Submittal is in accordance with the requirements of the Contract Drawings and Specifications. If there is any discrepancy between what is shown in the Submittal and the requirements of the Contract Drawings and Specifications, the Contractor shall, in its statement, list and clearly describe each such discrepancy.

Acceptance will be given based upon the Contractor's representation that what is shown in the Submittal is in accordance with the requirements of the Contract Drawings and Specifications. If



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the Contractor's statement indicates any discrepancy between what is shown in the Submittal and the requirements of the Contract Drawings and Specifications, such change is subject to review and prior written acceptance by the Design Consultant. In addition, such change may require a change order in accordance with Article 25 of the Contract. In the event any such change is approved, any additional expense or increased cost in connection with the change is the sole responsibility of the Contractor.

8. Submission of Shop Drawings:

- a. Initial Submission: The Contractor shall submit seven (7) copies of each Shop Drawing to the Design Consultant for his/her review and acceptance. The Design Consultant will transmit Shop Drawings to appropriate sub-consultants for review and acceptance, including Commissioning Authority/Agent as applicable. A satisfactory Shop Drawing will be stamped "No Exceptions Taken", be dated and distributed by the Design Consultant as follows:
- 1) Two (2) copies thereof will be returned to the Contractor by letter
 - 2) Three (3) copies of the approved Shop Drawing and copy of the transmittal letter to the Contractor will be forwarded to DDC
 - 3) One copy will be retained by the Design Consultant
 - 4) One copy will be forwarded / retained by sub-consultant(s) as appropriate

Should the Shop Drawing(s) be "Rejected" or noted "Revise and Resubmit" by the Design Consultant, the Design Consultant will return the Shop Drawings to the Contractor with the necessary corrections and changes to be made as indicated thereon.

- b. Revisions: The Contractor must make such corrections and changes and again submit seven (7) copies of each shop drawing to the Design Consultant. The Contractor shall revise and resubmit the Shop Drawing as required by the Design Consultant until the Shop Drawings are stamped "No Exceptions Taken". However, Shop Drawings which have been stamped "Make Corrections Noted" shall be considered an "Acceptable" Shop Drawing and NEED NOT be resubmitted.
- c. Commencement of Work: No work or fabrication called for by the Shop Drawings shall be done until the acceptance of the said drawings by the Design Consultant is given. In addition to the foregoing Shop Drawing transmissions, a copy of any Shop Drawing prepared by any of the Contractor's subcontractors which Shop Drawing indicated work related to, adjacent to, impinging upon, or affecting work to be done by other subcontractors shall be transmitted to the subcontractors so affected. [These accepted Shop Drawings shall be distributed to the affected subcontractors when required with a copy of the transmittal to the Resident Engineer.]
- d. Variations: If the Shop Drawings show variations from the Contract requirements because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in its letter of submittal. Acceptance of the Shop Drawings shall constitute acceptance of the subject matter thereof only and not of any structural apparatus shown or indicated.

G. Product Data:

1. General: Except as otherwise prescribed herein, the submission, review and acceptance of Product Data and Catalogue cuts shall conform to the procedures specified in Sub-Section 1.6 F, Shop Drawings.
2. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
3. Mark each copy of each submittal to show which products and options are applicable.
4. Include the following information, as applicable:



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- a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
5. Submit Product Data before or concurrent with Samples.
6. Submission of Product Data:
- a. Initial Submission: The Contractor shall submit seven (7) sets of Product Data to the Design Consultant for his/her review and acceptance. The Design Consultant will transmit Product Data to appropriate sub-consultants for review and acceptance, including Commissioning Authority/Agent as applicable. A satisfactory catalogue cut will be stamped "No Exception Taken", be dated and distributed as follows:
 - 1) Two (2) copies thereof will be returned to the Contractor by letter
 - 2) Three (3) copies of the Product Data and copy of the transmittal letter to the Contractor will be forwarded to DDC
 - 3) One copy will be retained by the Design Consultant
 - 4) One copy will be forwarded / retained by sub-consultant(s) as appropriateShould the Product Data be "Rejected" or noted "Revise and Resubmit" by the Design Consultant, the Design Consultant will return one (1) set of such Product Data to the Contractor with the necessary corrections and changes to be made indicated and one (1) set to DDC.
7. Revisions: The Contractor must make such corrections and changes and again submit seven (7) copies of each Product Data for the review of the Design Consultant. The Contractor shall revise and resubmit the Product Data as required by the Design Consultant until the submission is stamped "No Exceptions Taken" by the Design Consultant. However, Product Data which has been stamped "Make Corrections Noted" shall be considered an "Accepted" Product Data and NEED NOT be resubmitted.
- H. Samples of Materials:
1. For samples of materials involving electrical work of any nature, refer to Section 00 35 06 - 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.
 3. Each of the samples shall be labeled as follows:
 - a. Name of the Project, DDC Project Number and Contract Number
 - b. Name and quality of the material
 - c. Date



- d. Name of Contractor, subcontractor, manufacturer and supplier
 - e. Related Specification or Contract Drawing reference to the samples submitted
4. A letter of transmittal, in triplicate, from the Contractor requesting acceptance must accompany all such samples.
 5. Transportation charges to the Design Consultant's office must be prepaid on all samples forwarded.
 6. Samples for testing purposes shall be as required in the Specifications.
 7. Samples on Display: When samples are specified to be equal to approved product, they shall be carefully examined by the Contractor and by those whom the Contractor expects to employ for the furnishing of such materials.
 8. Timely Submissions Log/Schedule: Samples 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 acceptance is received, in writing, from the Design Consultant. All materials shall be furnished equal in every respect to the accepted samples.
 9. The Acceptance 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 Design Consultant, it is done with the distinct understanding that the materials to be furnished will fully and completely comply with the Specifications, the determination of which may be made at some later date by a laboratory test or by other procedure. Use of materials will be permitted only so long as the quality remains equal to the approved samples and complies in every respect with the Specifications, and the colors and textures of the samples on file in the office of the Design Consultant, for the project.
 10. Acceptability of test Data: The Commissioner will be the final judge as to acceptability of laboratory test data and performance in service of materials submitted.
 11. Valuable Samples: Valuable samples, such as hardware, plumbing and electrical fixtures, etc., not destroyed by inspection or test, will be returned to the Contractor and may be incorporated into the work after all questions of acceptability have been settled, providing suitable permanent records are made as to the location of the samples, their properties, etc.
 12. Equivalent Quality: Any material, article and/or equipment which is designated in the Drawings and/or Specifications by a number in the catalogue of any manufacturer or by a manufacturer's grade or trade name is designated for the purpose of describing the material, article and/or equipment and fixing the standard of performance and/or function, as well as the quality and/or finish. Any material, article and/or equipment which is other than what is specified in the Drawings and/or Specifications will only be accepted if the Commissioner makes a written determination that such material, article and/or equipment is equivalent to that which is specified in the Drawings and/or Specifications.
 13. The submission of any material, article and/or equipment as the equal of any material, article and/or equipment set forth in the Drawings and/or Specifications as a standard shall be accompanied by any and all information essential for determining whether such proposed material, article and/or equipment is equivalent to that which is specified. Such information shall include, without limitation, illustrations, drawings, descriptions, catalogues, records of tests, samples, as well as information regarding the finish, durability and satisfactory use of such proposed material, article and/or equipment under similar operating conditions.



REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.7

1.7 LEED SUBMITTALS:

- A. Comply with submittal requirements specified in Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL; Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS; Section 01 81 13.13, VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR LEED BUILDINGS; Section 01 81 19, INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS and Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS.
- B. LEED Building submittal information shall be assembled into one package per each applicable specification section, separate from all other non-LEED submittals. Each submittal package shall have a separate transmittal and identification as described in Sub-Section 1.5 herein.
- C. Number of Copies: Submit FOUR (4) copies of LEED submittals, in accordance with procedure described in Article 1.5 herein, unless otherwise indicated.
- D. Material Safety Data Sheets (MSDSs) for LEED Certification: Submit information necessary to show compliance with LEED certification requirements, which will be the limit of the Design Consultant's review for LEED compliance.
 - 1. Designated LEED submittals that include non-LEED MSDS data will not be reviewed. The entire submittal will be returned for re-submission.
- E. Product Cut Sheets and/or Shop Drawings for LEED Certification: Provide product cut sheets and/or shop drawings with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project. For detailed requirements refer to Sub-Section 1.6 of Section 01 81 13 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED PROJECTS.
 - 1. Provide the quantity, length, area, volume, weight, and/or cost of each product submitted as required to satisfy LEED documentation requirements. Refer to Sub-Section 1.6 of Section 01 81 13 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED PROJECTS.

1.8 ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING:

- A. In accordance with Section 01 10 00 Summary, Sub-Section 1.5 E, the Contractor shall submit reports to the Commissioner regarding the use of Ultra Low Sulfur Diesel Fuel and Best Available Technology (BAT) in Non road Vehicles. Submission of such reports shall be in accordance with the schedule, format, directions and procedures established by the Commissioner.

1.9 CONSTRUCTION PHOTOGRAPHS AND DVD RECORDINGS:

- A. Submit construction progress photographs and DVD recordings in accordance with requirements of Section 01 32 33, PHOTOGRAPHIC DOCUMENTATION

1.10 AS-BUILT DOCUMENTS:

- A. Submit all as-built documents in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.



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PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 33 00

SUBMITTAL PROCEDURES

01 33 00 - 10



SECTION 01 35 03
GENERAL MECHANICAL REQUIREMENTS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 03

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. The General Mechanical Requirements contained herein shall be followed by the Contractor, as well as its subcontractor for HVAC work. This Section sets forth the General Requirements applicable to mechanical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Specifications and/or the Contract Drawings, whichever requirement is the most stringent, as determined by the Commissioner, shall take precedence.

1.3 RELATED SECTIONS: Include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 33 00 SUBMITTAL PROCEDURES
- C. Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS
- D. Section 01 42 00 REFERENCES
- E. Section 01 77 00 CLOSEOUT PROCEDURES
- F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

- A. **CONCEALED PIPING AND DUCTS** -: 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. For work on existing piping any insulation on such existing piping is to be tested for asbestos and abated, if found to be positive by a certified asbestos contractor. Such testing and abatement shall occur prior to the performance of any work on these pipes.

1.5 SUBMITTALS:

- A. **INTENT OF MECHANICAL CONTRACT DRAWINGS** – Mechanical Contract Drawings are in part diagrammatic and show the general arrangement of the equipment, ducts and piping included in the Contract and the approximate size and location of the equipment.
- B. The Contractor shall follow these Contract Drawings in laying out the work and verify the spaces in which it will be installed. The Contractor shall submit, as directed, Mechanical Shop Drawings, roughing drawings, manufacturer's Shop Drawings, field drawings, cuts, bulletins, etc., of all materials, equipment and methods of installation shown or specified in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.



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1. Submit sheet metal shop standards. Submit manufacturer's product data including gauges, materials, types of joints, scaling materials and installations for metal ductwork materials and products.
2. Submit scaled layout drawing (3/8"=1") of metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, slopes of horizontal runs, wall and floor penetrations and connections. Show modifications of indicated requirements made to conform to local shop practice and how those modifications ensure that free area, materials and rigidity are not reduced. Layouts should include all the room plans, mechanical equipment rooms and penthouses. Method of attachment of duct hangers to building construction all with the support details. Coordinate shop drawings with related trades prior to submission.
3. Indicate duct fittings, particulars such as gauges, sizes, welds and configuration prior to start of work for low-pressure systems.
4. Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data and shop drawings in maintenance manual.

1.6 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.

1.7 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.

1.8 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. For work on existing piping, ducts and equipment the Contractor shall pay special attention during this task so as not to disturb the insulation on such piping, ducts or equipment.

1.9 STANDARDIZATION OF SIMILAR EQUIPMENT:

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.

1.10 SUPPORTING STRUCTURES DESIGNED BY THE CONTRACTOR:

Unless otherwise specified, supporting structures for equipment to be furnished by the Contractor shall be designed by an Engineer licensed in New York State retained by the Contractor. Supporting structures shall be 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:

- A. Structural Steel - ASTM Standard Specifications, AISC and New York City Construction Codes.



- B. 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 New York City Construction Codes for average concrete.
- C. 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.
- D. Drawings and calculations shall be submitted for review and acceptance in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

1.11 ELIMINATION OF NOISE:

- A. All systems and/or equipment provided under the Contract shall operate without objectionable noise or vibration.
- B. Should operation of any one or more of the several systems produce noise or vibration which is, in the opinion of the Commissioner, objectionable, the Contractor shall at its own expense make changes in piping, equipment, etc. and do all work necessary to eliminate objectionable noise or vibration.
- C. Should noise or vibration found objectionable by the Commissioner be transmitted by any pipe or portions of the structure from systems and/or equipment installed under the Contract, the Contractor 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.

1.12 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.

1.13 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.

1.14 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 in accordance with Section 01 77 00 CLOSEOUT PROCEDURES. The work shall not be deemed substantially complete until the certificates have been delivered. See General Comments regarding problems with specifying items required for substantial completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 35 03



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GENERAL MECHANICAL REQUIREMENTS

01 35 03 - 4



SECTION 01 35 06
GENERAL ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section sets forth the General Requirements applicable to electrical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Project Specifications and/or the Contract Drawings, whichever requirement is the most stringent, as determined by the Commissioner, shall take precedence.
- B. This Section includes the following:
1. Procedure for Electrical Approval
 2. Submittals
 3. Electrical Installation Procedures
 4. Electrical Conduit System Including Boxes (Pull, Junction and Outlet)
 5. Electrical Wiring Devices
 6. Electrical Conductors and Terminations
 7. Circuit Protective Devices
 8. Distribution Centers
 9. Motors
 10. Motor Control Equipment
 11. Schedule of Electrical Equipment

1.3 RELATED SECTIONS: Include without limitation the following:

- | | | |
|----|------------------|---------------------------------|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 33 00 | SUBMITTAL PROCEDURES |
| C. | Section 01 35 03 | GENERAL MECHANICAL REQUIREMENTS |
| D. | Section 01 42 00 | REFERENCES |
| E. | Section 01 77 00 | CLOSEOUT PROCEDURES |
| F. | Section 01 78 39 | CONTRACT RECORD DOCUMENTS |

1.4 DEFINITIONS:

- A. **WIRING:** means both wire and raceway (rigid steel, heavy wall conduit unless specifically indicated otherwise).
- B. **POWER WIRING:** means wiring from a panel board or other specified source to a starter (if required) then to a disconnect (if required), then to the final point of usage such as a motor, unit or device.
- C. **CONTROL and/or INTERLOCK WIRING:** 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.

- D. **RIGID STEEL CONDUIT:** shall 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 New York City Construction Codes.
- E. **ELECTRICAL METALLIC TUBING (EMT):** shall mean industry standard thin wall conduit of galvanized steel only. All elbows, bends, couplings and similar fittings which are installed as a part of the conduit system shall be compatible 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.
- F. **FLEXIBLE METALLIC CONDUIT (FMC):** Shall mean a conduit made through the coiling of a self-interlocking ribbed strip of aluminum or steel, forming a hollow tube through which wires can be pulled. For final connections to motors and motorized equipment, not more than a 4' - 0" length of flexible conduit may be used. For watertight installations, this conduit 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.

1.5 PROCEDURE FOR ELECTRICAL APPROVAL:

This Sub-Section sets forth General Electrical information, as well as required approvals for all electrical work required for the Project, including ancillary electrical work which may be included in the work of other trade subcontractors.

- A. **ELECTRIC SERVICE:** The electric service supply is subject to commercial and operating variation of the utility company. Proper provision shall be made to have all apparatus operate normally under these conditions.
- B. **ACCEPTANCE:** Acceptance and approval of the work will be contingent upon the inspection and test of the installation by the City regulatory agency.
- C. **TESTS:** The Contractor shall notify the Commissioner when the Contractor has completed the work and is ready to have it inspected and tested. Upon completion of the work tests 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 is 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.):** The Contractor must file prior to requesting a substantial completion inspection a Certificate of Inspection issued by B.E.C. On completion of the work the Contractor shall obtain certificates of inspection, approval, acceptance and compliance from all agencies and/or entities having jurisdiction over the work and shall deliver these certificates to the Commissioner in accordance with Section 01 77 00 CLOSEOUT PROCEDURES.
- E. **RESPONSIBILITY FOR CARE AND PROTECTION OF EQUIPMENT:**
 - 1. The Contractor furnishing any equipment shall be responsible for the equipment until it has been finally inspected, tested and accepted, in accordance with the requirements of the Contract.



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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 equipment 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 equipment, apparatus or materials of the same kind, type or classification which are intended to be used for identical types of service, shall be made by the same manufacturer.

1.6 SUBMITTALS:

A. **CONTRACTOR'S ELECTRICAL DRAWINGS AND SAMPLES FOR APPROVAL:**

1. The Contractor shall submit to the Commissioner for approval, in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, complete dimensional drawings of all equipment, wiring diagrams, motor test data, details of control, installation layouts showing all details and locations and including all schedules, and descriptions and supplementary data to comprise complete working drawings and instructions for the performance of the work. A description of the operation of the equipment and controls shall be included. A letter, in triplicate, shall accompany each submittal.
2. The Contractor shall submit in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, duplicate samples of such materials and appliances as may be requested by the Commissioner for approval. These samples 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.

- B. **TIMELINESS:** All material shall be submitted in accordance with the submittal schedule in sufficient time for the progress of construction. Failure to promptly submit acceptable samples and dimensional drawings of equipment will not be accepted as grounds for an extension of time. The Commissioner may decline to consider submittals unless all related items are submitted at the same time.
- C. **CONTRACTOR'S STATEMENT WITH SUBMITTALS:** Contractor shall submit statement in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- D. **BULLETINS AND INSTRUCTIONS:** The Contractor shall furnish and deliver to the Commissioner in accordance with Section 01 78 39, CONTRACT RECORD DOCUMENTS and Section 01 77 00, CLOSEOUT PROCEDURES, after acceptance of the work, four (4) complete sets of instructions, technical bulletins and any other printed matter (diagrams, prints, or drawings) required to provide complete information for the proper operation, maintenance and repair of the equipment and the ordering of spare parts.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 ELECTRICAL INSTALLATION PROCEDURES:

This Sub-Section sets forth the General Installation Procedure that shall apply to all electrical work and electrical equipment appearing in the Contract.

(Refer to Sub-Section 1.4 DEFINITIONS for terms used in this section)

- A. **INTENT OF CONTRACT DOCUMENTS:** The Drawings and Specifications are to be interpreted as a means of conveying the scope and intent of the work without giving every minor electrical detail. It is intended, nevertheless, that the Contractor shall provide whatever labor and materials are found necessary, within the scope of the Contract, for the successful operation of the installation. Specific details of individual installations are to be finally decided upon when the Contractor submits Working or Shop Drawings for approval to DDC. Whenever there are two (2) or more methods to complete project work within the Contract scope, the Commissioner reserves the right to choose that method which, in the Commissioner's opinion, will afford the most satisfactory performance, lasting qualities, and 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 DDC 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 subcontractor for Plumbing Work and shall extend one (1) inch above finished floor.
- D. **COORDINATION:** The 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. The Contractor is to consult all other Contract Drawings, as well as approved equipment Shop Drawings on file in the Resident Engineer's Field Office. This will aid in avoiding interferences, omissions and errors in the electrical installation.
- E. **RESTORATION:** If drilling or cutting is done on finished surfaces of equipment or the structure, any marring of the surface shall be repaired or replaced by the Contractor. The 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. If any piercing of waterproofing occurs because of the installation of the work, the Contractor shall restore the waterproofing, at its own expense, to the satisfaction of the Commissioner.
- F. **ELECTRICAL WORK AT SITE:** The Contractor furnishing equipment consisting of a number of related electrical devices or appliances, mounted in a single enclosure, or on a common base, 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, without additional cost to the City.
- G. **COOPERATION AMONG SUBCONTRACTORS:** Whenever an electrically operated unit or system involves the combined work of several subcontractors for its installation and successful operation, the



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Contractor shall require each subcontractor to exercise the utmost diligence in cooperating with others to produce a complete, harmonious installation.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2

3.2 ELECTRICAL CONDUIT SYSTEM INCLUDING BOXES (PULL, JUNCTION AND OUTLET):

This Sub-Section sets forth the requirements applying to the installation of electrical conduits, boxes or fittings. Rigid steel conduit shall be used throughout, unless otherwise directed by the Commissioner. 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.

(Refer to Sub-Section 1.4 DEFINITIONS for terms used in this section)

A. INSTALLATIONS AND APPLICATIONS:

1. Unless otherwise specified or indicated on the Contract Drawings, conduit runs 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 New York City Electrical Code 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 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 ½) parts of fine and coarse aggregate.
6. **EXCAVATION RESTORATION PERMITS:** When installing underground conduits, duct banks or manholes the Contractor shall perform the work of cutting pavement, excavation shoring, keeping trenches or holes pumped dry, backfilling, restoration of surfaces to original condition and removal of excess earth and rubbish from premises. During the work, the Contractor 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 Galvanized 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 the Contractor will be held responsible for determining where the building expansion joints are located.
 - b. Every 200 feet, when in straight runs of 200 feet or longer.
10. 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.
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 using a ball mandrel and a brush and snake before the installation will be accepted. The ball shall be 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 Resident Engineer. 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 Resident Engineer and submitted in triplicate for approval. This record shall be entered on the Contract Record Drawings under Section 01 78 39, CONTRACT RECORD DOCUMENTS.
 - d. **CAPPING:** All empty conduit and duct openings, after test, shall be capped or plugged by the Contractor as directed.
 - e. **DRAW LINES:** A draw line shall be left in all empty conduit.

B. 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 Galvanized 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 and be NEMA 4X. All pull boxes shall be suspended from ceiling or walls in the most substantial manner.
2. In centering outlets, the Contractor is cautioned to allow for overhead pipes, ducts and other obstructions, and for variations in arrangement and thickness of fireproofing, soundproofing and plastering. Precaution should be exercised regarding the location of window and door trims, paneling, etc. Mistakes resulting from failure to exercise precaution must be corrected by the Contractor at no additional cost to the City. Outlets in hung ceilings shall be supported from the black iron or structure.
 3. 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.
 4. Exposed wall outlet boxes shall be erected neatly and tight against the walls and securely anchored to same.
 5. 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.
 6. MOUNTING HEIGHTS: The following heights are standard heights and are subject to correction due to coordination with Contract Drawings. All such changes must be approved by the Resident Engineer. Heights given are from finished floor to center line of outlet or device on wall or partition, unless otherwise indicated.
 - a. General Convenience Outlets
(mount vertical) 1'-6"
 - b. Clock Outlets 8'-6" or 1'-6" below ceiling
 - c. Wall Lighting Switches 4'-0"
 - d. Motor Controllers 5'-0"
 - e. Motor Push-button 4'-2"
 - f. Telephone Outlets As Directed
 - g. Fire Alarm Bells 8'-6" or 1'-6" below ceiling
 - h. Fire Alarm Stations 4'-0"
 - i. Intercom Outlet 1'-6"
 - j. Cooking and Refrigerator Unit As Directed
 7. Outlet boxes 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.
 8. 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.
 9. 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.
 10. 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.



11. **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.
12. 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, non-corrodible and not less than four (4) in number for each box opening.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 ELECTRICAL WIRING DEVICES:

- A. **WALL SWITCHES** 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, 20 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4 ELECTRICAL CONDUCTORS AND TERMINATIONS:

- A. **CONDUCTORS FOR LIGHT AND POWER** - All wire and cable 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 applicable detailed Specifications.
- 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. **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.

I. 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 manufacturer. 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 subcontractor furnishing a device containing lugs is to coordinate with the Contractor 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB SECTION 3.5

3.5 CIRCUIT PROTECTIVE DEVICES:

This Section sets forth the circuit protective devices such as circuit breakers and safety switches, used in connection with Motor Control Equipment, Distribution Centers, Panel boards and Service Entrance.

A. CIRCUIT BREAKERS:

1. CIRCUIT BREAKERS: 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 BARRIER: 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. 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 Specifications or indicated on the Contract Drawings.
7. **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 and 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.
8. **CONSTANCY OF CALIBRATION:** The tripping elements shall insure constant calibration and be capable of withstanding excessive short circuit conditions without injury.
9. **CONTACTS:** shall be non-welding under operating conditions and of the silver to silver type.
10. **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.
11. **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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.6

3.6 DISTRIBUTION CENTERS:

This Section sets forth the construction and installation procedure for Switchboards, Panel boards and Cabinets.

- A. **PANELBOARDS-GENERAL TYPE:** The panel boards 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 dead front 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 panel board 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



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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:**
 - 1. **PANEL CABINET INSTALLATION:** When installed surface mounted in panel closets they shall be mounted on Kindorf channel.
 - 2. 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. **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.
- H. **SHOP DRAWINGS:** showing all details of boxes, panels, etc., shall be submitted for approval.
- I. **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, Polycarbonate 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.
- J. **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, panel boards shall be enclosed and gasketed NEMA 3R type. Panel boards located outdoors or exposed to the weather shall be NEMA 3X type.
 - 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.



REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB SECTION 3.7

3.7 MOTORS:

This Section sets forth the general design, construction and performance requirements, which shall apply to all motors furnished in the Contract.

- A. **MOTOR DESIGN:** All motors shall be designed to comply with the New York State Energy Conservation Construction Code and the New York City Energy Conservation Code. In the event of any conflict or inconsistency between such codes, the New York City Energy Conservation Code shall prevail. 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 the 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. **STANDARDS OF COMPARISON:** In the absence of specific motor specifications, 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.
- C. **OBJECTIONABLE NOISES:** Objectionable noises will not be tolerated and exceptionally quiet motors may be required for certain specified locations. Noise control tests as per the New York City Construction Codes may be performed as directed by the Commissioner. Such motors shall bear a nameplate lettered "Quiet Motor." Springs and slip rings shall be of approved non-ferrous material.
- D. **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. The Contractor furnishing four (4) or more such motors shall also furnish, as part of the 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.
- E. **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.
- F. **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.

- G. 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.
- H. MOTORS ON LIGHTING PANELS: The largest A.C. motor permitted on branch circuits of lighting panels shall not exceed 1/4 horsepower.
- I. MOTORS RATED: ½ horsepower and larger shall be polyphase.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8

3.8 MOTOR CONTROL EQUIPMENT:

This Section sets forth the requirements for motor controllers and associated devices. Such requirements are applicable to all motor control equipment furnished or installed.

- A. MANUFACTURER: All control equipment furnished under the Contract 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 furnishing motors 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 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 ½ horsepower or more, magnetic starters and circuit breakers shall be used. Single phase A.C. motors smaller than ½ horsepower or three-phase A.C. motors smaller than one (1) horsepower where manual control is specified may be furnished with starters of toggle

switch or push button type with inbuilt thermal protection. No additional disconnecting means is required to be furnished with this type of starter. This type of starter may also be used in series with automatic control devices such as thermostats, float and pressure switches, provided the individual motor or the sum of fractional horsepower motors is less than ½ horsepower. Means for manual operation 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 Article 3.5 **CIRCUIT PROTECTIVE DEVICES**. 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 Contractor's subcontractor(s) who furnish electrically operated equipment shall give to the Contractor and the Contractor's electrical subcontractor full information relative to sizes and locations of apparatus furnished by them which require electrical connections.
- I. **SPARE PARTS:**
 - 1. **FURNISH:** The Contractor shall furnish the following spare parts pertaining to equipment furnished by each subcontractor.
 - 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.

END OF SECTION 01 35 06



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Division 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS
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SECTION 01 35 26
SAFETY REQUIREMENTS PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].
- B. The Contractor shall comply with the requirements of "*The City of New York Department of Design and Construction Safety Requirements*". This document is included in the Information for Bidders.

1.2 SUMMARY:

- A. This Section includes administrative and general procedural requirements for Safety and Health Requirements, including:
 - 1. Definitions
 - 2. Required Safety Meeting
 - 3. Compliance with Regulations
 - 4. Submittals
 - 5. Personnel Protective Equipment
 - 6. Hazardous Materials
 - 7. Emergency Suspension of Work
 - 8. Protection of Personnel
 - 9. Environmental Protection

1.3 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 REQUIRED SAFETY MEETINGS:

- A. Prior to commencing construction, the Resident Engineer will schedule and hold a preconstruction kick-off meeting either at DDC's main office or at the Project site with representatives of the Contractor, including the principal on-site project representative and one or more safety representatives, Commissioner's designated representatives and other concerned parties for the purpose of reviewing the Contract Safety requirements. The Contractor's safety requirements shall be reviewed, and implementation of safety provisions pertinent to the Work shall be discussed.
- B. The Contractor is responsible for conducting weekly documented jobsite safety meetings, given to all jobsite personnel including all subcontractors on the project, with the purpose of discussing safety topics and job specific requirements at the DDC worksite.



1.5 COMPLIANCE WITH REGULATIONS:

- A. The Work, including contact with or handling of hazardous materials, disturbance or dismantling of structures containing hazardous materials, and disposal of hazardous materials, shall comply with the applicable requirement for CFR Parts 1910 and 1926, and 40 CFR, Parts 61, 261, 761 and 763.
- B. Work involving disturbance or dismantling of asbestos or asbestos containing materials, demolition of structures containing asbestos and removal of asbestos, shall comply with 40 CFR Part 61, Subparts A and M, and 40 CFR Part 763, as applicable.
- C. Work shall additionally comply with all applicable federal, state and local safety and health regulations.
- D. In case of a conflict between applicable regulations, the more stringent requirements shall apply.
- E. All workers working on the DDC project site are required by NYC Local Law 41 to complete the OSHA 10 –hour training course.

1.6 SUBMITTALS:

- A. The Contractor shall submit, to the Resident Engineer, copies of the Safety Program, Site Safety Plan and other required documentation in accordance with the "New York City Department of Design and Construction Safety Requirements."
- B. Permits: If hazardous materials are disposed of off-site submit copies of shipping manifests and permits from applicable federal, state or local authorities and disposal facilities, and submit certificates that the material has been disposed of in accordance with regulations to the Resident Engineer.
- C. Accident Reporting: Submit a copy of each accident report to the Resident Engineer in accordance with the "New York City Department of Design and Construction Safety Requirements."
- D. All Asbestos and Lead project regulatory notifications are to be submitted to DDC's Bureau of Environmental and Geotechnical Services (BEGS) through the Resident Engineer.
- E. Request for Subcontractor Approval: Any subcontractor performing environmental work shall submit required documentation for approval to perform such work as required by DDC's BEGS.

PART II – PRODUCTS

2.1 PERSONNEL PROTECTIVE EQUIPMENT:

Special facilities, devices, equipment and similar items used by the Contractor in execution of the Work shall comply with 29 CFR Part 1910, subpart I, Part 1926, subpart E and other applicable regulations.

2.2 HAZARDOUS MATERIALS:

- A. The Contractor shall bring to the attention of the Commissioner, any material encountered during execution of the Work that the Contractor suspects to be hazardous.
- B. The Commissioner shall determine whether the Contractor shall perform tests to determine if the material is hazardous. A change to the Contract price may be provided, subject to the applicable provisions of the Contract.
- C. If the material is found to be hazardous, the Commissioner may direct the Contractor to remediate the hazard and a change to the Contract price may be provided, subject to the applicable provisions of the Contract.



PART III – EXECUTION

3.1 EMERGENCY SUSPENSION OF WORK:

- A. When the Contractor is notified by the Commissioner of noncompliance with the safety provisions of the Contract, the Contractor shall immediately, unless otherwise instructed, correct the unsafe condition, at no additional cost to the City.
- B. If the Contractor fails to comply promptly, all or part of the Work may be stopped by notice from the Commissioner.
- C. When, in the opinion of the Commissioner, the Contractor has taken satisfactory corrective action, the Commissioner shall provide written notice to the Contractor that work may resume.
- D. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe condition.

3.2 PROTECTION OF PERSONNEL:

- A. The Contractor shall take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a subcontractor.
- B. Whenever practical, the work area shall be fenced, barricaded or otherwise blocked off from the Public or occupants to prevent unauthorized entry into the work area, in compliance with the requirements of Section 01 50 00, TEMPORARY FACILITIES, SERVICES AND CONTROLS, and including, without limitation, the following:
 - 1. Provide traffic barricades and traffic control signage where construction activities occur in vehicular areas.
 - 2. Corridors, aisles, stairways, doors and exit ways shall not be obstructed or used in a manner to encroach upon routes of ingress or egress utilized by the public or occupants, or to present an unsafe condition to the public or occupants.
 - 3. Store, position and use equipment, tools, materials, scraps and trash in a manner that does not present a hazard to the public or occupant by accidental shifting, ignition or other hazardous activity.
 - 4. Store and transport refuse and debris in a manner to prevent unsafe and unhealthy conditions for the public and occupants. Cover refuse containers, and remove refuse on a frequent regular basis acceptable to the Resident Engineer. Use tarpaulins or other means to prevent loose transported materials from dropping from trucks or other vehicles.

3.3 ENVIRONMENTAL PROTECTION:

- A. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances and regulations.
- B. Comply with applicable federal, state and local noise control laws, ordinances and regulations, including but not limited to 29 CFR 1910.95, 29 CFR 1926.52 and NYC Administrative Code Chapter 28 of Title 15.

END OF SECTION 01 35 26



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SECTION 01 35 91
HISTORIC TREATMENT PROCEDURES

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 91

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes administrative and procedural requirements for the treatment of Landmark Structures and Landmark Quality Structures, as identified in the Addendum. Specific requirements are indicated in other sections of the Specifications.
- B. This Section includes, without limitation, the following:
1. Storage and protection of existing historic materials
 2. Temporary protection of historic materials during construction
 3. General Protection
 4. Protection during use of heat-generating equipment
 5. Photographic Documentation
 6. NYC Landmarks Preservation Commission Final Approval signoffs

1.3 RELATED SECTIONS: include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
- C. Section 01 33 00 SUBMITTAL PROCEDURES
- D. Section 01 77 00 CLOSEOUT PROCEDURES
- E. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- C. Landmark Structure or Site: Any building or site which has been designated as a landmark, or any building or site within a landmark district, as designated by the New York City Preservation Commission or the New York State Historic Preservation Office.



- D. **Landmark Quality Structure:** Any building which has been determined by the City to be of landmark quality and/or historical significance.
- E. **Preservation:** To apply measures necessary to sustain the existing form, integrity, and materials of a historic property. Work may include preliminary measures to protect and stabilize the property.
- F. **Rehabilitation:** To make possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.
- G. **Restoration:** To accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and the reconstruction of missing features from the restoration period.
- H. **Reconstruction:** To reproduce in the exact form and detail a building, structure, or artifact as it appeared at a specific period in time.
- I. **Stabilize:** To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.
- J. **Protect and Maintain:** To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.
- K. **Repair:** To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.
- L. **Replace:** To duplicate and replace entire features with new material in kind. Replacement includes the following conditions:
 - 1. **Duplication:** Includes replacing elements damaged beyond repair or missing. Original material is indicated as the pattern for creating new duplicated elements.
 - 2. **Replacement with New Materials:** Includes replacement with new material when original material is not available as patterns for creating new duplicated elements.
 - 3. **Replacement with Substitute Materials:** Includes replacement with compatible substitute materials. Substitute materials are not allowed, unless otherwise indicated.
- M. **Remove:** To detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- N. **Remove and Salvage:** To detach items from existing construction and deliver them to the City ready for reuse.
- O. **Remove and Reinstall:** To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.
- P. **Existing to Remain or Retain:** Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.



- Q. Material in Kind: Material that matches existing materials, as much as possible, in species, cut, color, grain, and finish.

1.5 SUBMITTALS:

- A. Historic Treatment Program: Submit a written plan for each phase or process, including protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work.
- B. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of work, submit for Commissioner's approval a written description including evidence of successful use on other comparable projects, and program of testing to demonstrate effectiveness for use on this Project.
- C. Qualification Data: For historic treatment specialists as specified and required by individual sections of the project specifications.
- D. Photographs for Designated Landmark Structures: Submit photographs in accordance with Section 01 32 33, PHOTOGRAPHIC DOCUMENTATION and as described in this section.
- E. Record Documents: Include modifications to manufacturer's written instructions and procedures, as documented in the historic treatment preconstruction conference and as the Work progresses.

1.6 QUALITY ASSURANCE:

- A. Special Experience Requirements: Special Experience Requirements may apply to the firm that will provide Historic Treatment Services. If applicable, such Special Experience Requirements are set forth in the Bid Booklet and the Addendum.
- B. Historic Treatment Preconstruction Conference: The Resident Engineer will schedule and hold a preconstruction meeting at the site in accordance with Section 01 31 00, PROJECT MANAGEMENT AND COORDINATION.
 - 1. Review manufacturer's written instructions for precautions and effects of products and procedures on building materials, components, and vegetation.
 - a. Record procedures established as a result of the review and distribute to affected parties.

1.7 STORAGE AND PROTECTION OF HISTORIC MATERIALS:

- A. Removed and Salvaged Historic Materials: As specified and required by individual sections of the project specifications.
- B. Removed and Reinstalled Historic Materials: As specified and required by individual sections of the project specifications.
- C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by the Commissioner, items may be removed to a suitable, protected storage location during historic treatment and reinstalled in their original locations after historic treatment operations are complete.
- D. Storage and Protection: When removed from their existing location, store historic materials, at a location acceptable to the Commissioner, within a weather tight enclosure where they are protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.
 - 1. Identify removed items with an inconspicuous mark indicating their original location.



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PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 PROTECTION, GENERAL:

- A. Comply with manufacturer's written instructions for precautions and effects of products and procedures on adjacent building materials, components, and vegetation.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Temporary Protection of Historic Materials during Construction:
 - 1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.
 - 2. Attachments of temporary protection to existing construction shall be approved by the Commissioner prior to installation.
- D. Protect landscape work adjacent to or within work areas as follows:
 - 1. Provide barriers to protect tree trunks.
 - 2. Bind spreading shrubs.
 - 3. Use coverings that allow plants to breathe and remove coverings at the end of each day. Do not cover plant material with a waterproof membrane for more than 8 hours at a time.
 - 4. Set scaffolding and ladder legs away from plants.
- E. Existing Drains: Prior to the start of work or any cleaning operations, test drains and other water removal systems to ensure that drains and systems are functioning properly. Notify Commissioner immediately of drains or systems that are stopped or blocked. Do not begin Work of this Section until the drains are in working order.
 - 1. Provide a method to prevent solids, including stone or mortar residue, from entering the drains or drain lines. Clean out drains and drain lines that become blocked or filled by sand or any other solids because of work performed under this Contract.
 - 2. Protect storm drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT:

- A. No roofing work requiring the use of an open flame shall be permitted on any Landmark Structure or any Landmark Quality Structure, whose roof or wall structure is made of wood or primarily of wood.
- B. Comply with the following procedures while performing work with heat-generating equipment, including welding, cutting, soldering, brazing, paint removal with heat, and other operations where open flames or implements utilizing heat are used:
 - 1. Obtain Commissioner's approval for operations involving use of open-flame or welding equipment. Notification shall be given for each occurrence and location of work with heat-generating equipment.
 - 2. As far as practical, use heat-generating equipment in shop areas or outside the building.
 - 3. Before work with heat-generating equipment commences, furnish personnel to serve as a fire watch (or watches) for location(s) where work is to be performed.



4. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 5. Remove and keep the area free of combustibles, including, rubbish, paper, waste, etc., within area of operations.
 6. If combustible material cannot be removed, provide fireproof blankets to cover such materials.
 7. Where possible, furnish and use baffles of metal or gypsum board to prevent the spraying of sparks or hot slag into surrounding combustible material.
 8. Prevent the extension of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 9. Inspect each location of the day's work not sooner than 30 minutes after completion of operations to detect hidden or smoldering fires and to ensure that proper housekeeping is maintained.
- C. Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to automatic sprinkler heads, shield the individual heads temporarily with guards.

3.3 PHOTOGRAPHIC DOCUMENTATION:

Photographs for Designated Landmark Structures: Show existing conditions prior to any historic treatments, including one overall photograph and two close-up photographs of all areas of work affected. Show one overall photograph and two close-up photographs of all areas of work after the successful execution of all historical treatments.

3.4 NEW YORK CITY LANDMARKS PRESERVATION COMMISSION FINAL APPROVALS SIGNOFF:

For all projects involving a Landmark Structure or Site, the Contractor, at the completion of the work, shall submit to the Commissioner, in accordance with Section 01 78 39, CONTRACT RECORD DOCUMENTS, all documentation concerning the successful execution of all historic treatments. This shall include, but not be limited to, copies of all before and after photographs of historic treatments, one copy of the Contractor's as-built drawings, copies of testing and analysis results, including cleaning, mortar analysis, pointing mortars and all other information pertaining to work performed under the New York City Landmarks Preservation Commission jurisdiction.

END OF SECTION 01 35 91



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SECTION 01 40 00
QUALITY REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes the following:
- a. Definitions
 - b. Conflicting Requirements
 - c. Quality Assurance
 - d. Quality Control
 - e. Approval of Materials
 - f. Special Inspections (Controlled Inspection)
 - g. Inspections by Other City Agencies
 - h. Certificates of Approval
 - i. Acceptance Tests
 - j. Repair and Protection
- B. This Section includes administrative and procedural requirements for quality control to assure compliance with quality requirements specified in the Contract Documents.
- C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
- D. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
- E. Provisions of this Section do not limit requirements for the Contractor to provide quality-assurance and -control services required by the Commissioner or authorities having jurisdiction.
- F. Specific test and inspection requirements are specified in the individual sections of the Specifications.
- G. LEED: Refer to the Addendum to identify whether this project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS."
- H. COMMISSIONING: Refer to the Addendum to identify whether this project will be Commissioned by an independent third party under separate contract with the City of New York. Commissioning shall be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS. The Contractor shall cooperate with the commissioning agent and provide whatever assistance is required.



1.3 RELATED SECTIONS: Include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
- C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
- D. Section 01 33 00 SUBMITTAL PROCEDURES
- E. Section 01 77 00 CLOSEOUT PROCEDURES
- F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- C. Commissioning: A Total Quality Assurance process that includes checking the design and installation of equipment, as well as performing functional testing of the same to confirm that the installed equipment is operating and in conformance with the Contract Documents and the City's requirements.

1.5 CONFLICTING REQUIREMENTS:

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, the Contractor shall comply with the most stringent requirement as determined by the Commissioner. The Contractor shall refer any uncertainties and/or conflicting requirements to the Commissioner for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. The Contractor shall refer any uncertainties to the Commissioner for a decision before proceeding.

1.6 QUALITY ASSURANCE:

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required. Individual Specification Sections specify additional requirements.
- B. Installer Qualifications: Special Experience Requirements may apply to the firm that will install, erect or assemble specified work required for the Project. If applicable, such Special Experience Requirements are set forth in the Bid Booklet and the Addendum.
- C. Manufacturer Qualifications: Special Experience Requirements may apply to the firm that will manufacture equipment, products or systems specified for the Project. If applicable, such Special Experience Requirements are set forth in the Bid Booklet and the Addendum.



- D. **Fabricator Qualifications:** Special Experience Requirements may apply to the firm that will fabricate material, products or systems specified for the Project. If applicable, such Special Experience Requirements are set forth in the Bid Booklet and the Addendum.
- E. **Professional Engineer Qualifications:** A professional engineer who is licensed to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- G. **Mockups:** Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by the Resident Engineer.
 - 2. Notify Resident Engineer seven (7) days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Design Consultant's approval of mockups before starting work, fabrication, or construction.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise directed or indicated.

1.7 QUALITY CONTROL:

- A. **City's Responsibilities:** Where quality-control services are indicated as the City's responsibility in the Specifications, the City will engage a qualified testing agency to perform these services.
 - 1. **COST OF TESTS BORNE BY THE CITY:** Where the City directs tests to be performed to determine compliance with the Specifications regarding materials or equipment, and where such compliance is ascertained as a result thereof, the City will bear the cost of such tests.
 - 2. The City will furnish the Contractor with names, addresses, and telephone numbers of testing entities engaged and a description of the types of testing and inspecting they are engaged to perform.
 - 3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to the Contractor.
- B. **Contractor's Responsibility:** Tests and inspections not explicitly assigned to the City are the Contractor's responsibility. Unless otherwise indicated, the Contractor shall provide quality-control services as set forth in the Specifications and those required by Authorities having jurisdiction. The Contractor shall provide quality-control services required by Authorities having jurisdiction, whether specified or not.
 - 1. **COST OF TESTS BORNE BY CONTRACTOR** - In the case of tests which are specifically called for in the Specifications to be provided by the Contractor or tests which are required by any Authority having jurisdiction, but are not indicated as the responsibility of the City, the cost thereof shall be borne by the Contractor and shall be deemed to be included in the Contract price. The Contractor shall reimburse the City for expenditures incurred in providing tests on materials and equipment submitted by the Contractor as the equivalent of that specifically named in the Specifications and rejected for non-compliance.
 - 2. Where services are indicated as Contractor's responsibility, the Contractor shall engage a qualified testing agency to perform these quality-control services. Any testing agency engaged by the Contractor to perform quality control services is subject to prior approval by the Commissioner.



3. The Contractor shall not employ same entity engaged by the City, unless agreed to in writing by the Commissioner.
 4. The Contractor shall notify testing agencies and the Resident Engineer at least 72 hours in advance of the date and time for the performance of Work that requires testing or inspecting.
 5. Where quality-control services are indicated as Contractor's responsibility, the Contractor shall submit a certified written report, in triplicate to the Commissioner, of each quality-control service.
 6. Testing and inspecting requested by the Contractor and not required by the Contract Documents are Contractor's responsibility.
 7. The Contractor shall submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, the Contractor shall engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Results shall be submitted in writing as specified in Section 01 33 00 SUBMITTAL PROCEDURES.
- D. **Retesting/Re-inspecting:** Regardless of whether the original tests or inspections were the Contractor's responsibility, the Contractor shall provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. **Associated Services:** The Contractor shall cooperate with entities performing required tests, inspections, and similar quality-control services, and shall provide reasonable auxiliary services as requested. The Contractor shall notify the testing agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist testing entity in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing entities.
 6. Design mix proposed for use for material mixes that require control by the testing entity.
 7. Security and protection for samples and for testing and inspecting equipment at the Project site.
- F. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
 2. Coordinate and cooperate with the Commissioning Authority/Agent as applicable for start-up, inspection and functional testing in the implementation of the Commissioning Plan.
- G. **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.
- H. **Inspection of Material:** In the event that the Specifications require the Contractor to engage the services of an entity to witness and inspect any material especially manufactured or prepared for use in or part of the permanent construction, such entity shall be subject to prior written approval by the Commissioner.
1. **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.

- I. No Shipping Before Inspection: The Contractor shall comply with the foregoing before shipping any material.
- J. 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.
- K. 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.
- L. 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.
- M. Reports: Six (6) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Commissioner as a prerequisite for the acceptance of any material or equipment.
- N. Rejections: If, in making any test, it is ascertained by the Commissioner that the material or equipment does not comply with the Specifications, the Contractor will be notified thereof, and will be directed to refrain from delivering said materials or equipment, or to promptly remove it from the site or from the work and replace it with acceptable material at no additional cost to the City.
- O. Furnish Designated Materials: 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.

1.8 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 New York City Construction Codes, Administrative Code and Charter of the City of New York.
- B. Approval of Manufacturer: The names of proposed manufacturers, material suppliers, and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Commissioner for approval, as early as possible, to afford proper review and analysis. No manufacturer will be approved for any materials to be furnished under the Contract unless it shall have a plant of ample capacity and shall have successfully produced similar products. All approvals of materials or equipment that are legally required by the New York City Construction Codes and other governing Authorities must be obtained prior to installation.
- C. All Materials: Fixtures, fittings, supplies and equipment furnished under the Contract shall be new and unused, except as approved by the Commissioner, and of standard first-grade quality and of the best workmanship and design. The City of New York encourages the use of recycled products where practical.
- D. INFORMATION TO SUPPLIERS - In asking for prices on materials under any item of the Contract, the Contractor 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.

1.9 SPECIAL INSPECTIONS:

A. SPECIAL INSPECTIONS:

1. Inspection of selected materials, equipment, installation, fabrication, erection or placement of components and connections made during the progress of the Work to ensure compliance with the Contract Documents and provisions of the 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. The Contractor shall notify the relevant Special Inspector in writing at least 72 hours before the commencement of any work requiring special inspection.
2. Form TR3: Technical Report Concrete Design Mix: The contractor 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".
5. The contractor must coordinate with the Resident Engineer or DDC Project Manager to provide access and schedule the work for inspection by the Special Inspector.

1.10 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, the Contractor will be required to arrange for all final inspections by the inspection staff of the Department of Buildings, Fire Department or other Governmental Agencies having jurisdiction, and secure all reports, sign offs, certificates, etc., by such inspection staff or other governmental agencies, in order that a Letter of Completion or Certificate of Occupancy can be issued promptly.

1.11 CERTIFICATES OF APPROVAL:

- A. Responsibility: The Contractor shall be responsible for and shall obtain all final approvals for the work installed under the Contract in the form of such certificates that are required by all governmental agencies having jurisdiction over the work of the Contract.
- B. Transmittal: All such certificates shall be forwarded to the Commissioner through the Resident Engineer.



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1.12 ACCEPTANCE TESTS:

- A. Government Agencies: All equipment and appliances furnished and installed under the Contract shall conform to 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 Tests: 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 Special Inspections indicate that the material or procedures do not meet requirements as set forth on the Contract Drawings or in the Specifications or are otherwise unsatisfactory, the Contractor shall only proceed as directed by the Resident Engineer. Additional costs resulting from retesting, re-inspecting, replacing of material and/or damage to the work and any delay caused to the schedule shall be borne by the Contractor.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, the Contractor shall repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

END OF SECTION 01 40 00



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QUALITY REQUIREMENTS

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**SECTION 01 42 00
REFERENCES**

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 DEFINITIONS:

REFER TO THE ADDENDUM, Article IX, FOR ADDITIONAL DEFINITIONS AND REVISIONS TO THE CONTRACT AND SPECIFICATIONS

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. "APPROVED," ETC. - "Approved," "acceptable," "satisfactory," and words of similar import shall mean and intend approved, acceptable or satisfactory to the Commissioner.
- C. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- D. "DIRECTED," "REQUIRED," ETC.- Wherever reference is made in the Contract to the work or its performance, the terms "directed," "required," "permitted," "ordered," "designated," "prescribed," "determined," and words of similar import shall, unless expressed otherwise, imply the direction, requirements, permission, order, designation or prescription of the Commissioner.
- E. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings.



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1.3 CODES, AGENCIES AND REGULATIONS:

A.D.A.A.G.	Americans with Disabilities Act (ADA) – Architectural Barriers Act (ABA)
B.G. & E.	Bureau of Gas and Electricity of the City of New York
B.S. & A.	New York City Board of Standards and Appeals
DOE	Department of Energy
E.C.C.C.N.Y.S.	Energy Conservation Construction Code of New York State
EPA	Environmental Protection Administration
N.Y.C.C.C.	New York City Construction Codes – includes:
	New York City Plumbing Code
	New York City Building Code
	New York City Mechanical Code
	New York City Fuel Gas Code
N.Y.S.D.O.L	New York State Department of Labor
N.Y.C.D.E.P	New York City Department of Environmental Protection
N.Y.C.E.C.	New York City Electrical Code
N.Y.C.E.C.C	New York City Energy Conservation Code
N.Y.C.F.C	New York City Fire Code
N.Y.S.D.E.C.	New York State Department of Environmental Conservation
O.S.H.A.	Occupational Safety & Health Administration

1.4 INDUSTRY STANDARDS:

- A. STANDARD REFERENCES – Unless otherwise specifically indicated in the Contract Documents, whenever reference is made to the furnishing of materials or testing thereof that conforms to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification adopted and published by that technical society, organization or body, as of the date of the bid opening, Unless the provisions of the New York City Construction Codes adopts a different or earlier dated version of such standard.
- B. APPLICABILITY OF STANDARDS: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect, to the extent referenced, as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference.
- C. CONFLICTING REQUIREMENTS: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantity or quality, comply with the most stringent requirements. Immediately refer uncertainties, and requirements that are different but apparently equal, to the Commissioner in writing for a decision before proceeding.
- D. STANDARD SPECIFICATIONS - When no reference is made to a code, standard or specification, the Standard Specifications of the ASTM or the AIEE, as the case may be, shall govern.
- E. REFERENCES - Reference to a technical society, organization or body may be made in the Specifications by abbreviations. Abbreviations and acronyms used in the Specifications and other Contract Documents mean the associated name. The following names are subject to change and are



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believed, but are not assured, to be accurate and up-to-date as of the Issue Date of the Contract Documents.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AGMA	American Gear Manufacturer Association
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)

REFERENCES
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ALSc	American Lumber Standard Committee, Incorporated
ALI	Automotive Lift Institute
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	APA - The Engineered Wood Association
APA	Architectural Precast Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE/SEI	American Society of Civil Engineers, Structural Engineering Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWSC	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)



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BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CIBSE	Chartered Institute of Building Services Engineers
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CGSB	Canadian General Standards Board
CIMA	Cellulose Insulation Manufacturers Association
CIPRA	Cast Iron Pipe Research Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CPSC	Consumer Product Safety Commission
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)

REFERENCES
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DASMA	Door and Access Systems Manufacturer's Association International
DHI	Door and Hardware Institute
DOC	U.S. Department of Commerce – National Institute of Standards and Technology
EIA	Electronic Industries Alliance
DOJ	U.S. department of Justice
EIMA	EIFS Industry Members Association
DOL	U.S. Department of labor
EJCDC	Engineers Joint Contract Documents Committee
DOTn	U.S. Department of Transportation
EN	European Committee of Standards
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
EVO	Efficiency Valuation Organization
FEME	Federal Emergency Management Agency
FIBA	Federation Internationale de Basketball Amateur (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FMG	FM Global (Formerly: FM - Factory Mutual System)
FMRC	Factory Mutual Research (Now FMG)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute

REFERENCES

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HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
HUD	U.S. Department of Housing and Urban Development
IAPMO	International Association of Plumbing and Mechanical Officials
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICC	International Code Council, Inc.
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association

REFERENCES
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MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council

REFERENCES
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NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NIS	National Institute of Standards and Technology
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Acquired by ITS - Intertek)
PCI	Precast / Pre-stressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PPS	Power Piping Society
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RMI	Rack Manufacturers Institute
RTI	(Formerly: NTRMA - National Tile Roofing Manufacturers Association) (Now TRI)

REFERENCES
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SAE	SAE International
SCAQMD	South Coast Air Quality Management District
SCS	Scientific Certification System
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SGCC	Safety Glazing Certification Council
SHBI	Steel Heating Boiler Institute
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society

REFERENCES
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TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute (Formerly: RTI - Roof Tile Institute)
UL	Underwriters Laboratories Inc.
ULC	Underwriters Laboratories of Canada
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USC	United States Code
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WRI	Wire Reinforcement Institute, Inc.
USEPA	United States Environmental Protection Agency
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 42 00

REFERENCES
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No Text

REFERENCES
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SECTION 01 50 00
TEMPORARY FACILITIES, SERVICES AND CONTROLS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This section includes the following:
- a. Temporary Water System
 - b. Temporary Sanitary Facilities
 - c. Temporary Electric Power, Temporary Lighting System, And Site Security Lighting
 - d. Temporary Heat
 - e. Dewatering Facilities And Drains
 - f. Temporary Field Office for Contractor
 - g. Resident Engineer's Office
 - h. Material Sheds
 - i. Temporary Enclosures
 - j. Temporary Partitions
 - k. Temporary Fire Protection
 - l. Work Fence Enclosure
 - m. Rodent and Insect Control
 - n. Plant Pest Control Requirements
 - o. Project Identification Signage
 - p. Security Guards/Fire Guards on Site
 - q. Project Sign and Rendering
 - r. Safety

1.3 RELATED SECTIONS: include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 42 00 REFERENCES
- C. Section 01 54 11 TEMPORARY ELEVATORS AND HOISTS
- D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING
- E. Section 01 77 00 CLOSE OUT PROCEDURES

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Permanent Enclosure: As determined by Commissioner, permanent or temporary roofing that is complete, insulated, and weather tight; exterior walls which are insulated and weather tight; and all openings that are closed with permanent construction or substantial temporary closures.



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- C. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Reports: Submit reports of tests, inspections, meter readings and similar procedures for temporary use.

1.6 PROJECT CONDITIONS:

- A. Temporary Use of Permanent Facilities and Services: The Contractor shall be responsible for the operation, maintenance, and protection of each permanent facility and service during its use as a construction facility before Final Acceptance by the City, regardless of previously assigned responsibilities.
- B. Install, operate, maintain and protect temporary facilities, services and controls.
1. Keep temporary services and facilities clean and neat in appearance.
 2. Operate temporary services in a safe and efficient manner.
 3. Relocate temporary services and facilities as needed as Work progresses.
 4. Do not overload temporary services and facilities or permit them to interfere with progress.
 5. Provide necessary fire prevention measures.
 6. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on-site.

1.7 NON-REGULAR WORK HOURS (OVERTIME):

- A. The Contractor shall provide the temporary services, facilities and controls set forth in this Section during other than regular working hours if the Drawings and/or the Specifications indicate that the Work, or specific components thereof, must be performed during other than regular working hours. In such case, all costs for the provision of temporary services, facilities and controls during other than regular working hours shall be deemed included in the total Contract Price.
- B. The Contractor shall provide the temporary services, facilities and controls set forth in this Section during other than regular working hours if a change order is issued directing the Contractor to perform the Work, or specific components thereof, during other than regular working hours. In such case, compensation for the provision of temporary services, facilities and controls during other than regular working hours shall be provided through the change order.

1.8 SERVICES BEYOND COMPLETION DATE:

- A. The Contractor shall provide the temporary services, facilities and controls set forth in this Section until the date on which it completes all required work at the site, including all punch list work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. The Contractor shall provide such temporary services, facilities and controls even if completion of all required work at the site occurs after the time fixed for such completion in Schedule A.



PART II – PRODUCTS

2.1 MATERIALS:

- A. Provide undamaged materials in serviceable condition and suitable for use intended.
- B. Tarpaulins: Waterproof, fire-resistant UL labeled with flame spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- C. Water: Potable and in compliance with requirements of the Department of Environmental Protection.

2.2 EQUIPMENT:

- A. Provide undamaged equipment in serviceable condition and suitable for use intended.
- B. Water Hoses: Heavy-duty abrasive-resistant flexible rubber hoses, 100 feet (30 m) long with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electric Power Cords: Grounded extension cords.
 - 1. Provide hard-service cords where exposed to abrasion or traffic.
 - 2. Provide waterproof connectors to connect separate lengths of electric cords where single lengths will not reach areas of construction activity.
 - 3. Do not exceed safe length-voltage ratio.
- D. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART III – EXECUTION:

3.1 INSTALLATION, GENERAL:

- A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities as approved by the Resident Engineer.

3.2 TEMPORARY WATER SYSTEM:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2 A

- A. TEMPORARY WATER SYSTEM - NEW FACILITIES: During construction, the Contractor shall furnish a Temporary Water System as set forth below.
 - 1. Immediately after the Commissioner has issued an order to start work, the Contractor shall file an application with the Dept. of Environmental Protection for the schedule of charges for water use during construction. The Contractor will be responsible for payment of water charges.
 - 2. Immediately after the Commissioner has issued an order to start work, the Contractor shall file an application with the Department of Environmental Protection's Bureau of Water Supply and obtain a permit to install the temporary water supply system. The system shall be installed and maintained for the use of the Contractor and its subcontractors. A copy of the above mentioned permit shall be filed with the Commissioner. The Contractor 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 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 shall take the necessary precautions to prevent the temporary water system from freezing. The Contractor shall provide repairs to the temporary water supply system for the duration of the project until said temporary system is dismantled and removed.

3. Disposition of Temporary Water System: The Contractor shall be responsible for dismantling the temporary water system when no longer required for the construction operations, or when replaced by the permanent water system installed for the project, or as otherwise directed by the Resident Engineer. All repair work resulting from the dismantling of the temporary water system shall be the responsibility of the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2 B

B. TEMPORARY WATER SYSTEM – PROJECTS IN EXISTING FACILITIES:

1. When approved by the Commissioner, use of existing water system will be permitted for temporary water service during construction, as long as the system is cleaned and maintained in a condition acceptable to the Commissioner. At Substantial Completion, the Contractor shall restore the existing water system to conditions existing before initial use.
2. The Contractor shall be responsible for all repairs to the existing water system permitted to be used for temporary water service during construction. The Contractor shall be responsible to maintain the existing system in a clean condition on a daily basis, acceptable to the Commissioner.
3. The Contractor will be responsible for payment of water charges as directed by the Commissioner. Billing will be in accordance with the Department of Environmental Protection schedule of charges for Building Purposes.

C. WASH FACILITIES: The Contractor shall install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition.

1. Dispose of drainage properly.
2. Supply cleaning compounds appropriate for each condition.
3. Include safety showers, eyewash fountains and similar facilities for the convenience, safety and sanitation of personnel.

D. DRINKING WATER FACILITIES: The Contractor shall provide drinking water fountains or containerized tap-dispenser bottled-drinking water units, complete with paper cup supplies. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg. F (7 to 13 deg. C).

3.3 TEMPORARY SANITARY FACILITIES:

- A. The Contractor shall provide toilets, wash facilities and drinking water fixtures in compliance with regulations and health codes for type, number, location, operation and maintenance of fixtures and facilities. Provide toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility, and provide covered waste containers for used materials.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3 B

B. SELF-CONTAINED TOILET UNITS:

1. The Contractor shall provide temporary single-occupant toilet units of the chemical, aerated re-circulation, or combustion type for use by all construction personnel. Units shall be properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Quantity of toilet units shall comply with the latest OSHA regulations.
2. Toilets: Install separate self-contained toilet units for male and female personnel. Shield toilets to ensure privacy.



REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3 C

C. EXISTING TOILETS:

1. **TOILET FACILITIES:** When approved by the Commissioner, the Contractor shall arrange for the use of existing toilet facilities by all personnel during the execution of the work. The Contractor shall be responsible to clean and maintain facilities in a condition acceptable to the Resident Engineer and, at completion of construction, to restore facilities to their condition at the time of initial use.
2. **MAINTENANCE** - The Contractor shall maintain the temporary toilet facilities in a clean and sanitary manner and make all necessary repairs.
3. **NUISANCES** - The Contractor shall not cause any sanitary nuisance to be committed by its employees or the employees of its subcontractors in or about the work, and shall enforce all sanitary regulations of the City and State Health Authorities.

3.4 TEMPORARY ELECTRIC POWER, TEMPORARY LIGHTING SYSTEM, AND SITE SECURITY LIGHTING:

- A. **SCOPE:** This Section sets forth the General Conditions and procedures relating to Temporary Electric Power, Temporary Lighting System and Site Security Lighting during the construction period.
- B. **TEMPORARY ELECTRIC POWER:**
The Contractor shall provide and maintain a Temporary Electric Power service and distribution system of sufficient size, capacity and power characteristics required for construction operations for all required work by the Contractor and its subcontractors, including but not limited to power for the Temporary Lighting System, Site Security Lighting, construction equipment, hoists, temporary elevators and all field offices. Temporary Electric Power shall be provided as follows:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (1)

1. CONNECTION TO UTILITY LINES:

- a. **Temporary Electric Power Service** for use during construction shall be provided as follows: The Contractor shall make all necessary arrangements with the Public Utility Company and pay all charges for the Temporary Electric Power system. The Contractor shall include in its total Contract Price any charges for Temporary Electric Power, including charges that may be made by the Public Utility Company for extending its electrical facilities, and for making final connections. The Contractor shall make payment directly to the Public Utility Company.
- b. **APPLICATIONS FOR METER:** The Contractor 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 Electric Power. The Contractor shall pay to the Public Utility Company, all bills for Temporary Electric energy used throughout the work, as they become due.
- c. **SERVICE AND METERING EQUIPMENT** - The Contractor shall furnish and install, at a suitable location on the site, approved service and metering equipment for the Temporary Electric Power System, ready for the installation of the Public Utility Company's metering devices. The temporary service mains to and from the metering location shall be not less than 100 Amperes, 3-phase, 4-wire and shall be of sufficient capacity to take care of all demands for all construction operations and shall meet all requirements of the NYCEC.



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REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 E (2)

2. CONNECTION TO EXISTING ELECTRICAL POWER SERVICE:

- a. When approved by the Commissioner, electrical power service for the Temporary Lighting System and for the operation of small tools and equipment less than 1/4 horsepower may be taken from the existing electric distribution system if the existing system is of adequate capacity for the temporary power load. The Contractor shall cooperate and coordinate with the facility custodian, so as not to interfere with the normal operation of the facility.
- b. There will be no charge to the Contractor for the electrical energy consumed.
- c. The Contractor shall provide, maintain and pay all costs for separate temporary electric power for any temporary power for equipment larger than 1/4 horsepower. When directed by the Commissioner, the Contractor shall remove its own temporary power system.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (3)

3. ELECTRICAL GENERATOR POWER SERVICE:

- a. When connection to Utility Lines or existing facility electric service is not available or is not adequate to supply the electric power need for construction operations, the Contractor shall provide self-contained generators to provide power beyond that available.
- b. Pay for all energy consumed in the progress of the Work, exclusive of that available from the existing facility or Utility Company.
- c. Provide for control of noise from the generators.
- d. Comply with the Ultra Low Sulfur Fuel in Non-Road Vehicles requirements as set forth in Article 5.4 of the Contract.

C. USE OF COMPLETED PORTIONS OF THE ELECTRICAL WORK:

1. USE OF MAIN DISTRIBUTION PANEL: As soon as the permanent electric service feeders and equipment, metering equipment and main distribution panel are installed and ready for operation, the Contractor shall have the temporary lighting and power system changed over from the temporary service points to the main distribution panel.
2. COST OF CHANGE OVER - The Contractor shall be responsible for all costs 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 electric power service specified herein shall be adhered to after change over of service until final acceptance of the project.
4. NO EXTRA COST - The operation of the service and switchboard equipment shall be under the supervision of the Contractor, 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 D

D. TEMPORARY LIGHTING SYSTEM:

1. The Contractor 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
2. The Contractor shall furnish and connect to the metered service point, a Temporary Lighting System to illuminate the entire area where work is being performed and points adjacent to the work, with separately fused circuits for stairways and bridges. Control switches for stairway circuits shall be located near entrance on ground floor.
 3. ITEMS: The Temporary Lighting System provided by the Contractor 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, pigtails and any other incidental material. Additional details may be outlined in the detailed Specifications for the Electrical Work. Changes may be made, provided the full equivalent of those requirements is maintained.
 4. The Temporary Lighting System shall be progressively installed as required for the advancement of the work under the Contract.
 5. RELOCATION: The cost for the relocation or extension of the original Temporary Lighting System, required by the Contractor or its subcontractors, that is not required due to the normal advancement of the work, as determined by the Resident Engineer, shall be borne by the Contractor.
 6. PIGTAILS: shall be furnished with left-hand sockets with locked type guards and 40 feet of rubber covered cable. The Contractor shall furnish and distribute a minimum of three (3) complete pigtails to each subcontractor. See the detailed Electrical Specifications for possible additional pigtails required.
 7. LAMPS: The Contractor shall furnish and install one (1) complete set of lamps, including those for the trailers. Broken and burned out lamps in the temporary lighting system, DDC field office and construction trailers, shall be replaced by the Contractor. All lamps shall be compact fluorescent.
 8. CIRCUIT PROTECTION: The Contractor shall furnish and install GFI protection for the Temporary Lighting and Site Security Lighting Systems.
 9. MAINTENANCE OF TEMPORARY LIGHTING SYSTEM:
 - a. The Contractor shall maintain the Temporary Lighting System in good working order during the scheduled hours established.
 - b. The Contractor shall include in its total Contract Price all costs in connection with the Temporary Lighting System, including all costs for installation, maintenance and electric power.
 10. REMOVAL OF TEMPORARY LIGHTING SYSTEM: The temporary lighting system shall be removed by the Contractor when authorized by the Commissioner.
 11. HAND TOOLS: The temporary lighting system shall not be used for power purposes, except that light hand tools not larger than 1/4 horsepower may be operated from such system by the Contractor and its subcontractors.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 E

- E. SITE SECURITY LIGHTING (FOR NEW CONSTRUCTION ONLY):
1. The Contractor 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. All costs in connection with site security lighting shall be deemed included in the total Contract Price.
 2. It is essential that the site security lighting system be completely installed and operating, at the earliest possible date. The Contractor shall direct its subcontractors to 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, if a part of the system interferes with the work of any trade, the Contractor 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.
5. The site security lighting shall be kept illuminated at all times during the hours of darkness. The Contractor shall, at its own expense, shall keep the system in operation, and shall furnish and install all material necessary to replace all damaged or burned out parts.
6. The Contractor 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 and shall be removed and disposed of by the Contractor when authorized in writing by the Resident Engineer.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.5

3.5 TEMPORARY HEAT:

A. GENERAL:

1. Definition: The provision of Temporary Heat 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 Sub-Section 3.5 C herein.
 - 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 Fire Watch 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's responsibility for the provision of Temporary Heat, including 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 Sub-Section 3.5 B; the Contractor shall be responsible for the provision of Temporary Heat.
 - 2) Post Enclosure - Once the Commissioner determines that the building, or any portion thereof, has been enclosed, as set forth in Sub-Section 3.5 B, the Contractor 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).
 - 3) The Contractor 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 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 provided for herein is subject to the exception set forth in Sub-Section 3.5 A.2 (b) herein.
- b. Projects not involving Enclosure of the Building:
- 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 shall be responsible for the provision of Temporary Heat, except as otherwise provided in Sub-Section 3.5 H.3(b).2 herein.
 - 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 Sub-Section 3.5 H.3 (b).1 herein, determines that the provision of Temporary Heat is necessary due to special and/or unforeseen circumstances, the Contractor shall be responsible for the provision of Temporary Heat and shall be paid for the same in accordance with Sub-Section 3.5 H.3 (b).1 herein.
- B. ENCLOSURE OF STRUCTURES:
1. Notification: The Contractor shall notify all its subcontractors 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 Sub-Section 3.5 A.2 above, once the building has been enclosed, the Contractor 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 as described 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 and such work shall be deemed included in the Contract price.

C. TEMPERATURE REQUIREMENTS:

1. Unoccupied Buildings: The temperature requirement for the provision of Temporary Heat in unoccupied buildings 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 shall be required to provide Temporary Heat until the date on which it completes all required work at the site, including all punch list work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. The Contractor 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 shall include in its Total Contract 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 Addendum. 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 the New York City Fire Code and 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.



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- c. Portable fueled heating devices or equipment SHALL NOT BE ALLOWED for use as temporary heat other than construction-related curing or drying in conformance with the NYC Fire Code.
3. No open fires will be permitted.

F. TEMPORARY HEATING SYSTEM:

1. The temporary system for the provision of Temporary Heat provided by the Contractor following enclosure of the building shall be complete including, subject to provisions of paragraph E above, boilers pumps, radiators, space heaters, water and heating piping, insulation and controls. The temporary system for the provision of Temporary Heat shall be capable of maintaining the minimum temperature requirements set forth in Paragraph C above.

G. COORDINATION:

1. The Contractor, in the provision of Temporary Heat, shall coordinate its operations in order to insure sufficient and timely performance of all required work, including work performed by trade subcontractors. The Contractor 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 shall include all expenses in connection with the supply of water for Temporary Heat in its Total Contract Price. During the period in which Temporary Heat in an enclosed building is being furnished and maintained, the Contractor shall 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 shall maintain all permanent or temporary enclosures at its own expense.

H. USE OF PERMANENT HEATING SYSTEMS:

1. Use of Permanent Heating System for Temporary Heat after Building Enclosure
 - a. The Contractor 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 at his/her 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 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 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, including the placing of ancillary system equipment, shall be coordinated with the operations of all trade subcontractors so as to insure sufficient and timely performance of the work. Once the permanent heating system is operating properly, the Contractor shall remove all portions of the system for Temporary Heat not part of the permanent heating system.
3. Temporary Heat Allowance for Special Conditions or and/or Unforeseen Circumstances.
 - a. The City may establish an allowance in the Contract for payment of costs and expenses in connection with the provision of Temporary Heat as set forth herein. If established, the City will include an amount for such allowance on the Bid Form, and the Contractor shall



include such allowance amount in its Total Contract Price. The Contractor 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 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 the Commissioner determines that there is a need for maintenance of the permanent heating system by the Contractor after written acceptance by the Commissioner of the work, and that the need for such maintenance is not the fault of the Contractor, the Contractor 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 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 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 must present original invoices for the same. DDC reserves the right to furnish the required fuel.

I. RELATED ELECTRICAL WORK:

- 1. The Contractor shall be responsible for providing the items set forth below and shall include all expenses in connection with such items in its Total Contract Price. The Contractor shall provide such items promptly when required and shall in all respects coordinate its work with the work performed by trade subcontractors in order to facilitate the provision of Temporary Heat.
 - a. The Contractor 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 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. Such power shall be provided by the Contractor for the duration the Contractor is required to provide Temporary Heat, as set forth in Sub-section 3.5 D herein.
- 2. In providing the items set forth in Paragraph 1 above, the Contractor is advised that labor may be required seven (7) days a week and/or during other than normal working hours for the period of time required by seasonal weather conditions.



J. RELATED PLUMBING WORK:

1. The Contractor 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 this Contract. The Contractor shall include all expenses in connection with such items of work in its Total Contract Price. The Contractor shall provide such items of work promptly when required and shall in all respects coordinate its work with the work performed by trade subcontractors in order to facilitate the provision of Temporary Heat.
2. In the event portions of the permanent plumbing equipment furnished by the Contractor as part of the work of this Contract are used for the provision of Temporary Heat either during construction or prior to acceptance by the City of the complete plumbing system, the Contractor 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 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).

3.6 STORM WATER CONTROL, DEWATERING FACILITIES AND DRAINS:

A. PUMPING:

1. Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rainfall.
2. Contractor shall furnish and install all necessary automatically operated pumps of adequate capacity with all required piping to run-off agencies, so as to maintain the excavation, cellar floor, pits and exterior depressions and excavations free from accumulated water during the entire period of construction and up to the date of final acceptance of work of the Contract.
3. All pumps shall be maintained at all times in proper working order.
4. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
5. Remove snow and ice as required to minimize accumulations.

3.7 TEMPORARY FIELD OFFICE FOR CONTRACTOR:

- A. The Contractor 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 the 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. Arrangements shall be made by the Contractor whereby its representative may be readily accessible by telephone.
- E. All temporary structures shall be of substantial construction and neat appearance, and shall be painted a uniform gray unless otherwise directed by the Commissioner.
- F. **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.



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- 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.

3.8 DDC FIELD OFFICE:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 A

A. OFFICE SPACE IN EXISTING BUILDING:

1. The Resident Engineer will arrange for office space for sole use in the building where work is in progress. The Contractor shall provide and install a lockset for the door to secure the equipment in the room. The Contractor shall provide two (2) keys to the Resident Engineer. After completion of the project the Contractor shall replace the original lockset on the door and ensure its proper operation.
2. In addition to equipment specified in Sub-Section 3.8 D, the Contractor shall provide, for exclusive use of the DDC Field Office, the following:
 - a. Two (2) single pedestal desks, 42" x 32"; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Two metal (2) lockers, single units, 15" x 18" x 78" overall including 6" legs. Lockers to have flat key locks with two (2) keys each, General Steel products or approved equal. Two (2) full ball bearing suspension four (4) drawer vertical legal filing cabinets with locks, approximately 52"H x 28 1/2"D x 18"W.
 - b. 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.
 - c. One (1) folding conference table, 96" x 30" and ten (10) folding chairs.
 - d. Two (2) metal wastebaskets.
 - e. One (1) fire extinguisher, one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.
 - f. One (1) Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the project as required.
3. The Contractor shall provide one (1) telephone, where directed and shall pay all costs for telephone service for calls within the New York City limits for the duration of the project.
4. All furniture and equipment, except computer equipment specified in Sub-Section 3.8 D.3, shall remain the property of the Contractor.
5. Computer Workstation quantities shall be provided as specified in Sub-Section 3.8 B 3-a for DDC Managed Projects, or Sub-Section 3.8 B 3-b for CM Managed Projects.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 B

B. DDC FIELD OFFICE TRAILER:

1. **GENERAL:** The Contractor shall, for the time frame specified herein, provide and maintain at its own cost and expense a DDC Construction Field Office and all related items as specified herein [hereinafter collectively referred to as the "DDC Field Office"] for the exclusive use of the Resident Engineer. The DDC Field Office shall be located at the Project site and shall be solely dedicated to the Project. Provision of the DDC Field Office shall commence within THIRTY (30) days from Notice to proceed and shall continue through forty-five (45) days after Substantial Completion of the required construction at the Project site. The Contractor shall remove the DDC Field Office forty-five (45) days after Substantial Completion of the required construction, or as otherwise directed in writing by the Commissioner.
2. **TRAILER:** The Contractor shall provide at its own cost and expense a mobile office trailer for use as the DDC Field Office. The Contractor shall install and connect all utility services to the



trailer within thirty (30) days from Notice to Proceed. The trailer shall have equipment in compliance with the minimum requirements hereinafter specified. Any permits and fees required for the installation and use of said trailer shall be borne by the Contractor. The trailer including furniture and equipment therein, except computer equipment specified in Sub-Section 3.8D.3 herein, shall remain the property of the Contractor.

3. Trailer shall be an office type trailer of the size specified herein, with exterior stairs at entrance. Trailer construction shall be minimum 2 x 4 wall construction fully insulated with paneled interior walls, pre-finished gypsum board ceilings and vinyl tile floors.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8.B.3a OR
SUB-SECTION 3.8.B.3b

- a. DDC Managed Project Trailer: DDC Field Office Trailer Size, Layout and Computer Workstation:

- 1) Overall length: 32 Feet
Overall width: 10 Feet
- 2) Interior Layout:
Provide one (1) general office/conference room area and one (1) private office at one end of the trailer. Provide equipment and amenities as specified in Sub-Section 3.8.B herein.
- 3) Computer Workstation: Provide one (1) complete computer workstation, as specified in Sub-Section 3.8.D herein, in the private office area as directed by the Resident Engineer.

- b. CM Managed Project Trailer: DDC Field Office Trailer Size, Layout and Computer Workstation:

- 1) Overall length: 50 Feet
Overall width: 10 Feet
- 2) Interior Layout:
Provide one (1) large general office/conference room in the center of the trailer and two (2) private offices, one (1) each at either end of the trailer. Provide equipment and amenities as specified in Sub-Section 3.8.B herein.
- 3) Computer Workstation:
Provide three (3) complete computer workstations as specified in Sub-Section 3.8.D herein. Provide one (1) each complete computer workstation in each private office and one (1) complete computer workstation at the secretarial position as directed by the Resident Engineer.

4. The exterior of the trailer 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 PUBLIC BUILDINGS	3-1/2"
DDC FIELD OFFICE	2-1/2"

NOTE: In lieu of painting letters on trailer the Contractor may substitute a sign constructed of a good quality weatherproof material with the same type and size of lettering above.

5. All windows and doors shall have aluminum insect screens. Provide wire mesh protective guards at all windows.
6. The interior shall be divided by partitions into general and private office areas as specified herein. Provide a washroom located adjacent to the private office and a built-in wardrobe closet opposite the washroom. Provide a built-in desk in the private office(s) with fixed overhead shelf and clearance below for two (2) file cabinets.



7. Provide a built-in drafting or reference table, located in the general office/conference room, at least 60 inches long by 36 inches wide with cabinet below and wall type plan rack at least 42 inches wide.
8. The washroom shall be equipped with a flush toilet, wash basin with two (2) faucets, medicine cabinet, complete with supplies and a toilet roll tissue holder. Plumbing and fixtures 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.
9. HVAC: The trailer shall be equipped with central heating and cooling adequate to maintain a temperature of 72 degrees during the heating season and 75 degrees during the cooling season when the outside temperature is 5 degrees F. winter and 89 degrees F. summer.
10. Lighting shall be provided via ceiling mounted fluorescent lighting fixtures to a minimum level of 50 foot candles in the open and private office(s) along with sufficient lighting in the washroom. Broken and burned out lamps shall be replaced by the Contractor. A minimum of four (4) duplex convenience outlets shall be provided in the open office and two (2) each in the private office(s). These outlets shall be in addition to special outlet requirements for computer stations, copiers, HVAC unit, etc.
11. Electrical service switch and panel shall be adequately sized for the entire trailer load. Provide dedicated circuits for HVAC units, hot water heater, copiers and other equipment as required. All wiring and installation shall conform to the New York City Electrical Code.
12. The following movable equipment shall be furnished:
 - a. Two (2) single pedestal desks, 42" x 32"; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Two (2) full ball bearing suspension four (4) drawer vertical legal filing cabinets with locks and two (2) full ball bearing two (2) drawer vertical legal filing cabinets in each private office located below built-in desk.
 - b. One (1) folding conference table, 96" x 30" and ten (10) folding chairs.
 - c. Three (3) metal wastebaskets.
 - d. One (1) fire extinguisher one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.
 - e. One (1) Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the Contract as required.
13. TRAILER TEMPORARY SERVICE: Plumbing and electrical work required for the trailer will be furnished and maintained as below.
 - a. PLUMBING WORK: The Contractor shall provide temporary water and drainage service connections to the DDC Field Office trailer for a complete installation. Provide all necessary soil, waste, vent and drainage piping.

Contractor to frost-proof all water pipes to prevent freezing.

 - 1) REPAIRS, MAINTENANCE: The Contractor shall provide repairs for the duration of the project until the trailer is removed from the site.
 - 2) DISPOSITION OF PLUMBING WORK: At the expiration of the time limit set forth in Sub-Section 3.8 B 1 herein, the temporary water and drainage connections and piping to the DDC Field Office trailer shall be removed by the Contractor 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.
 - b. ELECTRICAL WORK:
 - 1) The Contractor shall furnish, install and maintain a temporary electric feeder to the DDC Field Office trailer immediately after it is placed at the job site.
 - 2) The temporary electrical feeder and service switch/fuse shall be adequately sized based on the trailer load and installed per the New York City Electrical Code and complying with utility requirements.



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- 3) Make all arrangements and pay all costs to provide electric service.
 - 4) The Contractor shall pay all costs for current consumed and for maintenance of the system in operating condition, including the furnishing of the necessary bulb replacements lamps, etc., for the duration of the project and for a period of forty-five (45) days after the date of Substantial Completion.
 - 5) Disposition of Electric Work: At the expiration of the time limit set forth, the temporary feeder, safety switch, etc., shall be removed and disposed of as directed.
 - 6) All repair work due to these removals shall be the responsibility of the Contractor.
- c. MAINTENANCE
- 1) The Contractor shall provide and pay all costs for regular weekly janitor service and furnish toilet paper, sanitary seat covers, cloth towels and soap and maintain the DDC Field Office in first-class condition, including all repairs, until the trailer is removed from the site.
 - 2) Supplies: The Contractor shall be responsible for providing (a) all office supplies, including without limitation, pens, pencils, stationery, filtered drinking water and sanitary supplies, and (b) all supplies in connection with required computers and printers, including without limitation, an adequate supply of blank CD's/DVD's, storage boxes for blank CDs/DVDs, and paper and toner cartridges for the printer.
 - 3) Risk of Loss: The entire risk of loss with respect to the DDC Field Office and equipment shall remain solely and completely with the Contractor. The Contractor shall be responsible for the cost of any insurance coverage determined by the Contractor to be necessary for the Field Office.
 - 4) At forty-five (45) days after the date of Substantial Completion, or sooner as directed by the Commissioner, the Contractors shall have all services disconnected and capped to the satisfaction of the Commissioner. All repair work due to these removals shall be the responsibility of the Contractor.
- d. TELEPHONE SERVICE: The Contractor shall provide and pay all costs for the following telephone services for the DDC Field Office trailer:
- 1) Separate telephone lines for one (1) desk phone in each private office.
 - 2) One (1) wall phone (with six (6) foot extension cord) at plan table.
 - 3) Separate telephone lines for the fax machine and internet access in each private office. Telephone service shall include voice mail.
 - 4) A remote bell located on outside of trailer.
 - 5) The telephone service shall continue until the trailer is removed from the site.
- e. PERMITS: The Contractor shall make the necessary arrangements and obtain all permits and pay all fees required for this work.

- C. RENTED SPACE: The Contractor has the option of providing, at its cost and expense, rented office or store space in lieu of trailer. Said space shall be in the immediate area of the Project and have adequate plumbing, heating and electrical facilities. Space chosen by the Contractor for the DDC Field Office must be approved by the Commissioner before the area is rented. All insurance, maintenance and equipment, including computer workstations specified in Sub-Section 3.8 D in quantities required as specified in Sub-Section 3.8 B 3 for the DDC Field Office trailer, shall also apply to rented spaces.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 D

- D. ADDITIONAL EQUIPMENT FOR THE DDC FIELD OFFICE:
1. The Contractor shall provide a high volume copy machine (50 copies per minute) for paper sizes 8½ x 11, 8½ x 14 & 11 x 17. Copier shall remain at job site until the DDC Field office trailer is removed from the site.



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2. The Contractor shall furnish a fax machine and a telephone answering machine at commencement of the project for the exclusive use of the DDC Field Office. 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.
3. **COMPUTER WORKSTATION:** The Contractor shall provide one complete computer workstation, in quantities specified in Sub-Section 3.8.B.4, as specified herein:
 - a. **Hardware/Software Specification:**
 - 1) **Computer Equipment -** Computers shall be provided for all contracts that have a Total Consecutive Calendar Days for construction duration as set forth in Schedule "A" of 180 CCD's or greater. Contracts of lesser duration shall not require computers.
 - 2) Computers furnished by the Contractor for use by City Personnel, for the duration of the contract, shall be in accordance with Specific Requirements, contained herein, shall remain the property of the City of New York at the completion of the project and shall meet the following minimum requirements:
 - 3) **Personal Computer(s) – Each Workstation Configuration.**
 - a) **Make and Model:** Dell; HP; Gateway; Acer; or, an approved equivalent. (Note: an approved equivalent requires written approval of the Assistant Commissioner of ITS.)
 - b) **Processor:** i5-2400 (6MB Cache; 3.1GHz) or faster computer - Single Processor.
 - c) **System RAM:** Minimum of 4GB (Gigabytes) Dual Channel DDR3 SDRAM at 1333MHz – 2 DIMMSs
 - d) **Hard Disk Drive(s):** 500 GB (Gigabytes) Serial ATA (7200RPM) w/DataBurst Cache, 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, and three (3) USB Ports.
 - h) **Video Display Card:** HD Graphics (VGA, HDMI) with a minimum of 64 MB of RAM.
 - i) **Monitor:** 22" W, 23.0 Inch VIS, Widescreen, VGA/DVI LCD Monitor.
 - j) **Available Exp. Slots:** System as configured above shall have at least two (2) full size PCI Slots available.
 - k) **Network Interface:** Integrated 10/100/1000 Ethernet card.
 - l) **Other Peripherals:** Optical scroll Mouse, 101 Key Keyboard, Mouse Pad and all necessary cables.
 - m) **Software Requirement:** Microsoft Windows 7 Professional SP1, 32 bit; Microsoft Office Professional 2010 or 2013; Microsoft Project 2010; Adobe Acrobat reader; Anti-Virus software package with 2 year updates subscription; and, either Auto Cad LT or Microsoft



Visio Standard Edition, as directed by the Resident Engineer.

- 4) DDC Field Office Specs: DDC Field Offices requiring computers shall be provided with the following:

- a) One (1) broad-band internet service account. Wideband Internet connectivity at a minimum throughput of 15 Mbps download and 5 Mbps upload is required at each field office location with 1-5 staffers. For larger field offices see table below for minimum required upload speeds. Telephone service should be bundled together with Internet connectivity. Because of throughput requirements Verizon FIOS is the preferred connectivity provider where available.

Office Personnel #	Upload Speeds (Minimum)
1 – 5	5 Mbps
6 – 10	10 Mbps
11 – 15	15 Mbps
16 – 20 ...	20 Mbps

This account will be active for the life of the project. The e-mail name for the account shall be the DDC Field Office/project Id (e.g. FLD K HWK666 McGuinness@earthlink.com).

- b) One (1) 600 DPI HP Laser Jet Printer (twelve (12) pages per minute or faster) with one (1) Extra Paper (Legal Size)
c) All necessary cabling for equipment specified herein.
d) Storage Boxes for Blank CD's
e) Printer Table
f) UPS/Surge Suppressor combo
- 5) All computers required for use in the Engineer's Field Office shall be delivered, installed, and setup in the Field Office by the Contractor.
- 6) 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.
- 7) An adequate supply of blank CDs/DVDs, 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 Resident Engineer.
- 8) It is the Contractor's responsibility to ensure that electrical service and phone connections are also available at all times; that is, the Field Office Computer(s) is to be powered and turned on twenty-four (24) hours each day.
- 9) Broadband connectivity is preferred at each field office location. Please take into consideration that an extra phone line dedicated to the modem must be ordered as part of the contract unless Internet broadband connectivity, via Cable or DSL, is available at the planned field office location. Any questions regarding this policy should be directed to the Assistant Commissioner of Information Technology Services at 718-391-1761.
- 10) **Ownership:** The equipment specified above shall, unless otherwise directed by the Commissioner, be the sole property of the City of New York upon delivery to the DDC Field Office. The Contractor shall prepare and maintain an accurate inventory of all equipment which it purchases for the DDC Field Office. Such inventory shall be provided to the City of New York. Upon completion of the



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required services, as directed by the Commissioner, the Contractor shall turn such equipment over to the City of New York.

E. 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 DDC Field Office.
2. Upon completion of the project, the helmets shall become the property of the Contractor.

3.9 MATERIAL SHEDS:

- A. 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.
- B. Store combustible materials apart from the facility.

3.10 TEMPORARY ENCLOSURES:

- A. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
- B. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

3.11 TEMPORARY PARTITIONS:

- A. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied tenant areas from fumes and noise.
 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 2. Construct dustproof partitions with 2 layers of 3-mil (0.07-mm) polyethylene sheet on each side. Cover floor with 2 layers of 3-mil (0.07-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
 3. Insulate partitions to provide noise protection to occupied areas.
 4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
 5. Protect air-handling equipment.
 6. Weather strip openings.
 7. Provide walk-off mats at each entrance through temporary partition.

3.12 TEMPORARY FIRE PROTECTION:

- A. Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
- B. Prohibit smoking in all areas.
- C. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.



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- D. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
- E. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.13

3.13 WORK FENCE ENCLOSURE:

- A. The Contractor shall furnish, erect and maintain a wood construction or chain-link fence to the extent shown on the drawings or required by the work enclosing the entire project on all sides. All materials used shall be new. Any permit required for the installation and use of said fence and costs shall be borne by the Contractor.
- B. WOOD FENCE shall be 7'-0" high with framing construction of yellow pine, using 4" x 4" approved preservative-treated posts on not more than 6'-0" centers, with three (3) rails of at least 2" x 4" size to which shall be secured minimum 1/2 inch thick exterior grade plywood. 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.
 - 1. 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 provided with tension or sag rods for the swinging sections.
 - 2. PAINTING - The fence and gates shall be entirely painted on the street and public sides with one (1) coat of exterior primer and one (1) top coat of exterior grade acrylic-latex emulsion paint. Black stenciled signs reading "POST NO BILLS" shall be painted on fence with three (3) inch high letters on 25 foot spacing for the entire length of fence on street traffic sides. Signs shall be stenciled five (5) feet above the sidewalk.
- C. CHAIN-LINK FENCING shall be minimum 2-inch thick, galvanized steel, chain-link fabric fencing; 8 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Fence shall be accurately aligned and plumb, adequately braced and complete with gates, locks and hardware as required. Under no condition shall fencing be attached or anchored to existing construction or trees.
- D.
 - 1. It shall be the obligation of the Contractor to remove all posters, advertising signs, and markings, etc., immediately.
 - 2. Should the fencing be required to be relocated during the course of the Contract, it shall be done by the Contractor at no additional cost to the City.
 - 3. Where sidewalks are used for "drive over" purposes for Contractor vehicles, a suitable wood mat or pad shall be provided for protection of sidewalks and curbs.
 - 4. Where required, make provision for fire hydrants, lampposts, etc.
 - 5. REMOVAL - When directed by the Resident Engineer, the fence shall be removed.

3.14 RODENT AND INSECT CONTROL:

- A. DESCRIPTION: The 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:



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- 1 Wet areas within the project area, including all temporary structures.
- 2 All exterior and interior temporary toilet structures within the project area.
- 3 All Field Offices and shanties within the project area of all subcontractors and DDC.
- 4 Wherever there is evidence of food waste and/or discarded food or drink containers, in quantity, that would cause breeding of rodents or the insects herein specified.
- 5 Any other portion of the premises requiring such special attention.

B. MATERIALS:

- 1 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.

C. PERSONNEL:

- 1 All pest control personnel must be supervised by an exterminator licensed in categories 7A and 8.

D. METHODS:

1. Application and dosage of all materials shall be done in strict compliance with the manufacturer's recommendations.
2. Any unsanitary conditions, such as uncollected garbage or debris, resulting from all Contractor's activities, which will provide food and shelter to the resident rodent population shall be corrected by the Contractor immediately after notification of such condition by the Resident Engineer.

E. RODENT CONTROL WORK:

- 1 In wetlands, woodlands and areas adjacent to a stream, special precautions must be taken to protect water quality and to ensure the safety of other wildlife. To prevent poisoned bait from entering streams, no poisoned bait shall be used in areas within seventy-five (75) feet of all stream banks. Live traps must be used in these seventy-five (75) foot buffer zone areas and within wetland and woodland areas.
- 2 In areas outside the seventy-five (75) foot zone of protection adjacent to streams, and in areas outside wetlands and woodlands, tamper proof bait stations with poisoned bait shall be placed during the period of construction and any consumed or decomposed bait shall be replenished as directed.
- 3 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.
- 4 The Contractor shall be responsible for collecting and disposing of all trapped and poisoned rodents found in live traps and tamper proof bait stations. The Contractor shall also be responsible for posting and maintaining signs announcing the baiting of each particular location.
The Contractor shall be responsible for the immediate collection and disposal of any visible rodent remains found on streets or sidewalks within the project area.
- 5 It is anticipated that public complaints will be addressed to the Commissioner. The 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.
- 6 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.



F. EDUCATION & NOTICES:

- 1 The 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 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.
- 2 Prior to application of any chemicals, the 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.

G. RECORDS

1. The 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.
2. The Contractor shall maintain records of all locations baited along with the type and quantity of rodenticide and insecticide bait used.

3.15 PLANT PEST CONTROL REQUIREMENTS and TREE PROTECTION REQUIREMENTS:

A. Plant Pest Control Requirements: The Contractor and its subcontractors, including the Certified Arborist described below, 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.

1. 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.
2. 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.
3. 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.
4. 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



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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.

B. 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.

1. 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 in paragraph A above; (3) evaluation of the general health and condition of any infected plant material.
2. 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.
3. 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.
 - a. 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).
 - b. 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.
 - c. The Certified Arborist determines that the critical root zone (CRZ) of an off-site tree, significant shrub, or primary cluster of stems in a planting mass extends into the project site, whether or not that plant material is located within the 50-foot inclusionary perimeter as outlined above.
4. 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.

- C. 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.

3.16 PROJECT IDENTIFICATION SIGNAGE:

- A. The Contractor shall provide, install and maintain Project identification and other signs where indicated to inform public and individuals seeking entrance to the Project.
B. In order to properly convey notice to persons entering upon a City construction site, the Contractor shall furnish and install a sign at the entrance (gates) as follows:

NO TRESPASSING

AUTHORIZED PERSONNEL ONLY

- C. If no construction fence exists at the site, this notice shall be conveyed by incorporating the above language into safety materials (barriers, tape, and signs).
D. Provide temporary, directional signs for construction personnel and visitors.
E. Maintain and touch up signs so that they are legible at all times.

3.17 PROJECT CONSTRUCTION SIGN AND RENDERING:

- A. PROJECT SIGN:
- 1 Responsibility: The Contractor shall produce and install one (1) project sign which shall be posted and maintained upon the site of the project at a place and in a position 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 the sign in first class condition and in proper position. Prior to fabrication, the Contractor shall submit an 8-1/2" x 11" color match print proof from the sign manufacturer of the completed sign for approval by the Commissioner.
 - 2 Sign Quality: The Contractor 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 pre-finished both sides with a glossy white baked-on enamel finish and be flush with edge of 2" x 2" wood frame. Samples must be submitted for approval.
 - d. Fastening: Fasten sign panel to wood frame using cadmium plated no. 8 sheet metal screws at 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. A digital file of the project sign will be provided to the Contractor by the Commissioner's representative for printing. 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. All signs may include a second panel for a project rendering as described in Sub-Section 3.17.B herein.
 - b. The digital file shall be reproduced at the Sign Panel size of 4' x 8' on 3M High Performance Vinyl or approved equal. The 3M High Performance Vinyl or equivalent shall be guaranteed for nine (9) years. Guarantee must cover fading, peeling, chipping or cracking. The sign manufacturer is required to maintain all specified Pantone Matching System (PMS) type and other composition elements represented in the digital file of the project sign.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.17.B

B. PROJECT RENDERING:

1. Responsibility: In addition to the Project Sign, the Contractor shall furnish and install one (1) sign showing a rendering of the project. A digital file of the project rendering will be provided to the Contractor by the Commissioner's representative. From an approved image file provided by DDC, the Project Rendering is to be sized, printed, and mounted in an identical manner as described in Sub-Section 3.17.A above for the Project Sign. A color match print proof from the sign manufacturer of the Rendering Sign printed from the supplied file is to be submitted to DDC for approval before fabrication. The Rendering Sign is to be posted at the same height as the Project Sign. Where possible, the Rendering Sign 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.18

3.18 SECURITY GUARDS/FIRE GUARDS ON SITE:

A. SECURITY GUARDS (WATCHMEN):

1. The Contractor shall provide competent Security Guard Service on the site, beginning on the date on which the Contractor commences actual construction work, or on such earlier date on which there is activity at the site related to the work, including without limitation, delivery of



- materials or construction set-up. The Contractor shall continue to provide such Security Guard Service until the date on which it completes all required work at the site, including all punch list work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. Throughout the specified time period, there 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 trade subcontractors. 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.
2. Every Security Guard shall be required to hold a "Certificate of Fitness" issued by the Fire Department. Every Security Guard shall, during his/her tour of duty, perform the duties of Fire Guard in addition to his/her security obligations.
 3. Should the Commissioner find that any Security Guard is unsatisfactory; such guard shall be replaced by the Contractor upon the written demand of the Commissioner.
 4. Each Security Guard furnished by the Contractor shall be instructed by the Contractor to include in his/her duties the entire construction site including the Field Office, temporary structures, and equipment, materials, etc.
 5. Should the Contractor or any other subcontractor consider the security requirements outlined above inadequate, the Contractor 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.
 6. Nothing contained in this Sub-Section shall diminish in any way the responsibility of the Contractor and each subcontractor for its own work, materials, tools, equipment, nor for any of the other risks and obligations outlined hereinbefore in this Article.
- B. COSTS - The Contractor shall employ Security Guards/Fire Guards throughout the specified time period, except as otherwise modified by the detailed Specifications and as approved by the Commissioner, for the purpose of safeguarding and protecting the site. All costs for Security Guards/Fire Guards shall be borne by the Contractor.
- C. RESPONSIBILITY - The Contractor and its subcontractors will be responsible for safeguarding and protecting their own work, materials, tools and equipment.

3.19 SAFETY:

- A. The Contractor, in compliance with requirements of Section 01 35 26, SAFETY REQUIREMENTS PROCEDURES, shall provide and maintain all necessary temporary closures, guard rails, and barricades to adequately protect all workers and the public from possible injury. Any removal of these items, during the progress of the work, shall be replaced by the Contractor at no additional cost to the City.

END OF SECTION 01 50 00



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No Text

TEMPORARY FACILITIES, SERVICES AND CONTROLS
01 50 00 -28



SECTION 01 54 11
TEMPORARY ELEVATORS AND HOISTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This section includes the following:
1. Temporary Use, Operation and Maintenance of Elevators during Construction
 - a. For New buildings up to 15 Stories
 - b. For New buildings over 15 Stories
 - c. For Existing Buildings
 2. Temporary Construction Hoists and Hoist ways (For Material and Personnel)

1.3 RELATED SECTIONS: include without limitation the following:

- A. Section 01 10 00 SUMMARY
B. Section 01 42 00 REFERENCES
C. Section 01 50 00 TEMPORARY FACILITIES AND CONTROLS
D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING
E. Section 01 77 00 CLOSE OUT PROCEDURES

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.1

3.1 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR NEW BUILDINGS UP TO AND INCLUDING 15 STORIES:

- A. **INSTALLATION:** The Contractor shall install, complete, operate, and maintain in good working order, as indicated herein, one (1) selected main elevator for the transport of employees of the Contractor and/or its subcontractors, and representatives of the DDC and other Governmental Agencies having jurisdiction of work at the project. The Contractor shall furnish, install, and maintain such elevator in good working order, including all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices, temporary hand reset target annunciators, temporary signal devices, and all other permanent or temporary parts. The installation, operation and maintenance of the temporary elevator and all equipment and/or parts utilized in connection therewith 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 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.



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- C. **COSTS:** The Contractor shall be responsible for all costs in connection with the temporary elevator, including without limitation: (1) installing and operating the temporary elevator, (2) maintaining the temporary elevator in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance, (3) performing all work in pits, shaft ways and machine rooms necessary for the operation of the temporary elevator, (4) replacing the temporary elevator or any equipment or parts utilized in connection therewith, if required, due to damage, destruction or excessive wear or corrosion, except for the replacement of hoisting ropes as set forth below, (5) performing all required electrical work in connection with the temporary elevator, (6) providing all electric power required to operate the temporary elevator, (7) providing all necessary conduit and wiring connections for the proper operation and signaling of the temporary elevator, and (8) providing all labor for the operation and maintenance of the temporary elevator, including on an overtime basis if necessary. The total Contract Price shall include all costs in connection with the temporary elevator, including without limitation, the costs specified herein.
- D. **COMMENCEMENT OF SERVICE:** The Contractor 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 shaft way 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 shaft ways.
 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, 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 shaft way and for the car control and signal traveling cables. The Contractor shall make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.
- F. **REMOVAL:** When elevators for permanent use have been installed and are in condition for service, and when directed by the Commissioner, the Contractor shall remove the temporary enclosures and all temporary elevator equipment and promptly proceed with the installation of the permanent equipment as required under the Contract.
- G. **INSPECTION:** Before temporary elevator equipment is removed, a joint inspection of the equipment shall be made by the Contractor and the Commissioner to determine the condition of this equipment upon the discontinuation of its temporary use. If this inspection deems it necessary, the Contractor 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 therefore will be made in accordance with Article 26 of the Contract.



- H. **REPLACEMENT:** The Contractor shall furnish and install new equipment or parts for any equipment or parts of the temporary elevator installation that have been damaged, destroyed, or that indicate excessive wear or corrosion, excepting the replacement of hoisting ropes. All shaft ways, 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 except for the replacement of hoisting ropes.
- I. **LIMITATIONS ON USE:** The temporary elevator shall not be used during its operation for the hoisting of materials or the removal of rubbish, but shall be limited only to the transportation of employees of the Contractor and/or its subcontractors, and representatives of DDC and other Governmental Agencies having jurisdiction of work at the project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation, but only after such times as all plastering has been completed from the second floor up. In the event of any damage to the temporary elevator, the Contractor shall notify the Resident Engineer within 24 hours after such damage has occurred. As indicated above, the Contractor shall be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.
- J. **LIQUIDATED DAMAGES:** The Contractor will be charged at the rate of \$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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2

3.2 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR NEW BUILDING OVER 15 STORIES:

- A. **INSTALLATION:** The Contractor shall install, complete, operate, and maintain in good working order, as indicated herein, two (2) selected main elevators for the transport of employees of the Contractor and/or its subcontractors, and representatives of the DDC and other Governmental Agencies having jurisdiction of work at the project. The Contractor shall furnish, install, and maintain such elevators in good working order, including all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices, temporary hand reset target annunciators, temporary signal devices, and all other permanent or temporary parts. The installation, operation and maintenance of the temporary elevators and all equipment and/or parts utilized in connection therewith 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 shall not be operated simultaneously.
- B. **RESPONSIBILITY:** The Contractor shall be responsible for any injury to persons or damage to property arising out of the temporary elevators and all equipment and/or parts utilized in connection therewith.
- C. **COSTS:** The Contractor shall be responsible for all costs in connection with the temporary elevators, including without limitation: (1) installing and operating the temporary elevators, (2) maintaining the temporary elevators in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance, (3) performing all work in pits, shaft ways and machine rooms necessary for the operation of the temporary elevators, (4) replacing the temporary elevators or any equipment or parts utilized in connection therewith, if required due to damage, destruction or excessive wear or corrosion, except for the replacement of hoisting ropes as set forth below, (5) performing all required electrical work in connection with the temporary elevators, (6) providing all electric power required to operate the temporary elevators, (7) providing all necessary conduit and wiring connections for the proper operation and signaling of the temporary elevators, and (8) providing all labor for the operation and maintenance of the temporary elevators, including on an overtime basis if necessary. The total Contract Price shall



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include all costs in connection with the temporary elevators, including without limitation, the costs specified herein.

- D. **LOW RISE ELEVATOR:** The Contractor 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 shaft ways.
 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 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 shall make all these required connections as soon as the Equipment is declared ready for such connections by the Resident Engineer.
- F. **HIGH RISE ELEVATOR:** The Contractor 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 shaft way 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 shaft ways.
 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. **ELECTRICAL INSTALLATION:** The Contractor, 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 shaft way. The Contractor shall make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.
- H. When the high rise elevator is completed and ready for temporary operation, the low rise temporary elevator shall be shut down.
- I. **REMOVAL:** 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 shall remove the temporary enclosures and all temporary elevator equipment, and promptly proceed with the installation of the permanent equipment as required under the Contract.
- J. **INSPECTION:** Before temporary elevator equipment is removed, a joint inspection of the equipment shall be made by the Contractor and the Commissioner to determine the condition of this equipment upon the discontinuation of its temporary use. If this inspection determines it necessary, the Contractor 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 therefore will be made in accordance with Article 26 of the Contract.
- K. **REPLACEMENT:** The Contractor shall furnish and install new equipment or parts for any equipment or parts of the temporary elevator installations that have been damaged, destroyed, or that indicate excessive wear or corrosion, excepting the replacement of hoisting ropes. All shaft ways, 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 except for the replacement of hoisting ropes.
- L. **LIMITATIONS ON USE:** The temporary elevators shall not be used during their operation for the hoisting of materials or the removal of rubbish, but shall be limited only to the transportation of employees of the Contractor and/or its subcontractors, and representatives of DDC and other Governmental Agencies having jurisdiction of work at the project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation, but only after such times as all plastering has been completed from the second floor up. In the event of any damage to the temporary elevator, the Contractor shall notify the Resident Engineer within 24 hours after such damage has occurred. As indicated above, the Contractor shall be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.
- M. **LIQUIDATED DAMAGES:** The Contractor will be charged at the rate of \$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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB SECTION 3.3

3.3 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR EXISTING BUILDINGS:

- A. The Contractor may use, at the Commissioner's discretion, one (1) selected elevator in the building for temporary operation by the Contractor for the transportation of employees of the Contractor and/or its subcontractors, and representatives of DDC and other Governmental Agencies having jurisdiction over the work at the Project. The operation of the temporary elevator and all equipment and/or parts utilized in



connection therewith 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 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.
- C. **REPLACEMENT:** The Contractor shall furnish and install new equipment or parts for any equipment or parts of the elevator for temporary operation that have been damaged, destroyed, or that indicate excessive wear or corrosion, excepting the replacement of hoisting ropes. All shaft ways, 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 except for the replacement of hoisting ropes. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes shall be installed and payment therefore will be made in accordance with Article 26 of the Contract.
- D. **LIMITATIONS ON USE:** The temporary elevator shall not be used during its operation for the hoisting of materials or the removal of rubbish, but shall be limited only to the transportation of employees of the Contractor and/or its subcontractors, and representatives of DDC and other Governmental Agencies having jurisdiction of work at the project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation. In the event of any damage to the temporary elevator, the Contractor shall notify the Resident Engineer within 24 hours after such damage has occurred. As indicated above, the Contractor shall be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.
- E. **LIQUIDATED DAMAGES:** The Contractor will be charged at the rate of \$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.

3.4 TEMPORARY HOISTS AND HOISTWAYS (FOR MATERIAL AND PERSONNEL):

- A. **RESPONSIBILITY:** The Contractor shall provide adequate numbers of material hoists for the most expeditious performance of all parts of the work including the work of all its subcontractors.
- B. **LOCATIONS:** No hoists shall be constructed at such locations as will interfere with, or affect the construction of, floor arches, or the work of subcontractors. The hoists may be located at the exterior sides of the structure or in the courtyard and extend upward adjacent to the line of window openings. The hoists 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 hoist ways, providing such use complies with the requirements of the Building Code of the City of New York and has been approved by the Commissioner, and providing further it entails no interference with the progress of the work.
- D. **PROTECTION FOR INTERIOR HOISTS:** All interior material hoist ways 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.

END OF SECTION 01 54 11



SECTION 01 54 23
TEMPORARY SCAFFOLDING AND PLATFORMS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].
- B. Section 01 35 26: Safety Requirements Procedures.
- C. The Contractor shall comply with the requirements of "The City of New York Department of Design and Construction Safety Requirements". This document is included in the Information for Bidders.

1.2 SUMMARY:

- A. This Section includes administrative and general procedural requirements for Temporary Scaffolding and Platforms, including:
 - 1. Conformance
 - 2. Responsibility
 - 3. Jobsite Documentation and Submittals
 - 4. Inspections
- B. This Section governs ALL scaffold used on DDC project sites including, but not limited to, Suspended Scaffold, Supported Scaffold and Sidewalk Sheds.

1.3 CONFORMANCE:

- A. Unless otherwise indicated, the Contractor is responsible for providing, erecting, installing and maintaining all temporary scaffolding and platforms which 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 items and personnel set forth in this section.

1.4 RESPONSIBILITY:

- A. Jobsite Safety Coordinator: The Contractor shall designate and employ a Jobsite Safety Coordinator, who shall be a competent person, who shall have a daily presence on the project site during scaffold use. This designee must possess and maintain a valid New York City Department of Buildings supported scaffold certificate of completion. An alternate shall also be designated, in the event that the Jobsite Safety Coordinator is absent. The Jobsite Safety Coordinator shall:
 - 1. Verify completeness of documentation and submittals (as described below).
 - 2. Verify that inspections are performed, including pull tests (see below), reports are filed and reported deficiencies are corrected.
 - 3. Monitor trades using scaffold.
 - 4. Limit access to scaffold areas that are tagged for non-use.
 - 5. Inform trades of scaffold load limitations.
 - 6. Monitor loading of decks.
 - 7. Verify that any ties that are temporarily removed are properly restored in the same shift.
 - 8. Verify that outriggers and planks that are moved are properly set up and secured.
 - 9. Verify that all scaffold decks in use have proper access/egress.
 - 10. Verify that all open sides of decks in excess of 14 inches have proper guardrails and toe-boards.



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11. Notify appropriate parties, including but not limited to the Resident Engineer, site safety coordinator / monitor, site safety consultant, scaffold users, contractor and the scaffold engineer, of misuses, non-conformances, hazards and accidents.
 12. Keep a log of significant actions and events connected with the scaffolding.
- B. The Contractor shall be responsible for erecting, maintaining and dismantling the scaffolding and/or sidewalk shed in conformance with requirements of the New York City Building Code, OSHA and the Contract documents, including the specifications. The Contractor shall also be guided by generally accepted standards of scaffold industry practice as promulgated by the Scaffold Industry Association.
- C. The Contractor shall require the subcontractor responsible for erecting the scaffolding to engage a Scaffold Engineer, licensed as a professional engineer by the State of New York. The Scaffold Engineer shall be responsible to ensure the following: (1) that the installation design is in compliance with requirements of the New York City Building Code and OSHA, (2) that the design comports with the capabilities of the components and the characteristics of the site, (3) that scaffold loads on the host building, including netting, have been properly considered, and (4) that the design documents provide accurate information for erectors and users.
- D. Scaffold users are trade contractors assigned to work on the scaffold. Training certificates from a 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 Safety Coordinator and to inform the Jobsite Safety Coordinator of known hazards, non-conformances or violations.

1.5 JOBSITE DOCUMENTATION AND SUBMITTALS:

The Contractor shall prepare, obtain and submit the following to the Resident Engineer:

- A. 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;
- B. Site logistics plan / site safety plan;
- C. Installation drawing(s), design and product data to be provided for all scaffold(s) and shed(s) must include, at a minimum:
 1. Plan(s);
 2. Elevation(s);
 3. Duty load designation; "standard" (150 psf live load) or "heavy duty" (300 psf live load).
 4. Details including base support, anchors and ties;
 5. Notes and specifications including load limits, number of planked levels, tie spacing, netting, and sequence of installation and removal.
 6. Anchorage into sound material.
 7. Load limits based on pull tests;
 8. Specifications for pull test(s), method, proof load and the number of trials;
 9. Elevations, levels or heights, where anchorage is made into masonry;
 10. Specifications for frames, planks, screw jacks, anchors, and any other ancillary hardware;
 11. Samples for anchors, ties and netting;
 12. Sequence of operations for erection and demolition;
 13. Location plan, heights, widths, "jumps" over doorways and driveways;
 14. Specify size, maximum span and maximum spacing of headers and stringers;
 15. Specify legs, girts, braces, nailing and connections;
 16. All sidewalk sheds shall be designed, engineered, signed and sealed by a Professional Engineer licensed in the State of New York;
 - a. Generic (not job specific) engineering drawings are satisfactory for standard sheds and arrangements.



- b. Special engineering is required for custom sheds, site-specific problems or non-standard arrangements.

1.6 INSPECTIONS:

- A. Signed inspection reports shall be issued for each inspection and pull-test below, and shall be logged and maintained on site by the Jobsite Safety Coordinator for the duration of the project.
- B. 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.
- C. 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.
- D. 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.
- E. 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.
- F. 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.
- G. Scaffolds and Sidewalk Sheds shall be inspected daily by the Jobsite Safety Coordinator or alternate prior to use by scaffold users. The inspection results must be recorded in the maintenance log, and be available on-site at all times.
- H. At the completion of the project, submit all inspection documents as Miscellaneous Record Documents in accordance with Section 01 78 39, CONTRACT RECORD DOCUMENTS.

1.7 LADDERS AND STAIRS:

- A. The Contractor 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.

1.8 ACCESS AND EXITS:

- A. 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.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 54 23



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Division 01 – DDC STANDARD GENERAL CONDITION
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
Revised - January 15, 2015

No Text

TEMPORARY SCAFFOLDING AND PLATFORMS
01 54 23 - 4



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITION
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
Revised - January 15, 2015

SECTION 01 73 00 EXECUTION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes general procedural requirements governing execution of the Work including without limitation the following:
1. Delivery of Materials
 2. Contractor's Superintendent
 3. Surveys
 4. Borings
 5. Examination
 6. Environmental Assessment
 7. Preparation
 8. Deferred Construction
 9. Installation
 10. Permits
 11. Transportation
 12. Sleeves and Hangers
 13. Sleeve and Hanger Drawings
 14. Cutting and Patching
 15. Location of Partitions
 16. Furniture and Equipment
 17. Removal of Rubbish and Surplus Material
 18. Cleaning
 19. Security And Protection of Work Site
 20. Maintenance of Site and Adjoining Property
 21. Maintenance of Project Site
 22. Safety Precautions for Control Circuits
 23. Obstructions in Drainage Lines

1.3 RELATED SECTIONS: Include without limitation the following:

- | | | |
|----|------------------|--|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 31 00 | PROJECT MANAGEMENT AND COORDINATION |
| C. | Section 01 33 00 | SUBMITTAL PROCEDURES |
| D. | Section 01 74 19 | CONSTRUCTION WASTE MANAGEMENT & DISPOSAL |
| E. | Section 01 77 00 | CLOSEOUT PROCEDURES |
| F. | Section 01 78 39 | CONTRACT RECORD DOCUMENTS |



1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 QUALITY ASSURANCE:

- A. Land Surveyor Qualifications: A professional land surveyor who is licensed in the State of New York and who is experienced in providing land-surveying services of the kind indicated.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 DELIVERY OF MATERIALS:

- A. Material Orders: The Contractor 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. Deliveries: The Contractor shall coordinate deliveries in order to avoid delaying or impeding the progress of the work.
- E. Handling: The Contractor shall provide equipment and personnel to handle products by methods to prevent soiling or damage.
 - 1. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.
 - 2. Promptly return damaged shipments or incorrect orders to manufacturer.
 - 3. For materials or equipment to be reused or salvaged, use special care in removal, storage and reinstallation to insure proper function in completed work.
- F. Storage: Store products in accordance with provisions of Article 3.1, and periodically inspect to assure that stored products are undamaged and are maintained under required conditions.
- G. 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.
- H. 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.



- I. No Interference: If it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the work or interfering with the work to be done by any trade subcontractor, the Contractor shall remove and restack such materials at no additional cost to the City.

3.2 CONTRACTOR'S CONSTRUCTION SUPERINTENDENT:

- A. Contractor's Construction Superintendent: The Contractor 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 Construction Superintendent. The Contractor's Construction Superintendent shall be registered with the New York City Department of Buildings in compliance with the Construction Superintendent Rule of the City of New York and shall be competent and capable of maintaining proper supervision and care of the work and shall be acceptable to the Commissioner. The Construction Superintendent shall, 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 Construction Superintendent on the job shall not be changed or removed without the consent of the Commissioner.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 SURVEYS:

- A. Line and Grade: The City will establish a baseline and bench mark near the site of the work for use 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: The 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 Markers: 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 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 shall establish the permanent lines of exterior walls. The 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 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.



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- 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 land Surveyor licensed in the State of New York 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 shall submit to DDC 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4 BORINGS:

- A. The work of this article shall be the responsibility of the Contractor unless otherwise indicated.
- B. **Reference Drawings:** The Boring Drawings as listed on the title sheet are for information to the bidder and are to be used under the conditions as follows:
 - 1. **Boring Logs:** shown on the Boring Drawings, record information obtained under engineering supervision in the course of exploration carried out by or under the direction of forces of the Department of Design and Construction at the site.
 - 2. **Soils and Rock Samples:** All inferences are drawn from the indications observed as made by engineering and scientific personnel. All such inferences and all records of the work including soil samples and rock cores, if any, are available to bidders for inspection.
 - 3. **Certification of Samples:** The City certifies that the work was carried out as stated, and that the soil samples and rock cores, 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.
 - 4. **Bidder's Responsibility:** The bidder, however, is responsible for any conclusions to be drawn from the work. If the bidder accepts those of the City, it must do so at its own risk. If the bidder prefers not to assume such risk, the bidder is under the obligation of employing its own experts to analyze the available information, and must be responsible for any consequences of acting on their conclusions.
 - 5. **Continuity Not Guarantee:** The City does not guarantee continuity of conditions shown at actual boring locations over the entire site. Where possible, borings are located to avoid all obstructions and previous construction which can be found by inspection of the surface and the bidder is required to estimate the influence of such features from its own inspection of the site.



3.5 EXAMINATION:

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground utilities and other construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with the subcontractor responsible for installation or application present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.6 ENVIRONMENTAL ASSESSMENTS:

- A. City Responsibilities: An Environmental Assessment and survey is performed by the NYC DDC and its findings are included in the Contract Documents. In accordance with the NYC Administrative Code Title 15 Chapter 1 an asbestos survey is required to be performed by an Asbestos Investigator certified by the NYC Department of Environmental Protection (DEP) to identify the presence of asbestos containing material (ACM) prior to any alteration, renovation or demolition activity. The findings of such survey are required for the submission of approvals and permits issued by the NYC Department of Buildings (DOB). When the findings indicate that asbestos containing material is present and will be disturbed during the alteration, renovation or demolition activity then abatement design specifications will be incorporated into the contract documents. The Contractor shall comply with all federal, state and local asbestos regulations affecting the work for this Contract.
- B. Contractor Responsibility: The Contractor shall comply with all federal, state and local environmental regulations, including without limitation USEPA and OSHA regulations which require the Contractor to assess if lead based paint will be disturbed during the work in order to protect his/her workers and the building occupants from migration of lead dust into the air. The Contractor shall comply with all federal, state and local environmental waste disposal regulation which may be required during the work. The Contractor is required to hire licensed abatement and disposal companies for the requisite work.

3.7 PREPARATION:

- A. Field Measurements: The Contractor shall verify all dimensions and conditions on the job so that all work will properly join the existing work.
- B. The Contractor, before commencing work, shall examine all adjoining work on which its work is in any way dependent on good workmanship in accordance to the intent of the Specifications and the Contract



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Drawings. The Contractor shall report to the Commissioner any condition that will prevent it from performing work that conforms to the required standard.

- C. Existing Utility Information: Furnish information to the Commissioner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.8 DEFERRED CONSTRUCTION:

- A. 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 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.
- B. The Contractor shall confer with the affected trade subcontractors and ascertain arrangements, time and facilities necessary to be made by the Contractor in order to execute the provisions specified herein.

3.9 INSTALLATION:

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work and work of trade subcontractors to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by the Design Consultant.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.



- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.10 PERMITS:

- A. The Contractor 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.

3.11 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.12

3.12 SLEEVES AND HANGERS:

- A. Coordinate with Progress Schedule: The Contractor shall promptly furnish and install conduits, outlets, piping sleeves, boxes, inserts and all other materials and equipment that is to be built into the work in conformity with the requirements of the project.
- B. Cooperation of Subcontractors: All subcontractors 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 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 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.
- D. Inserts: The Contractor is to install strip inserts four (4) foot on center and perpendicular to beams in ceiling slabs of boiler, machine and mechanical equipment rooms. Inserts are to be installed for strippable concrete slabs only.



REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.13

3.13 SLEEVE AND PENETRATION DRAWINGS:

- A. As soon as practicable after the commencement of work and when the order in which concrete for the first slabs, walls, etc. to be poured is determined, the Contractor shall submit to the DDC a sketch indicating the location and size of all penetrations for sleeves, ducts, etc. which will be required to accommodate the mechanical trades, in order to determine if such penetrations will materially weaken the project's structure. The sketch shall be stamped and returned if approved and/or comments will be transmitted. The Contractor shall continue to submit sketches as the pouring schedule and the concrete work progresses and, until approvals for the penetration sketches have been given. The Contractor shall not predicate its layout work on unapproved sketches.

3.14 CUTTING AND PATCHING:

- A. Responsibility: The Contractor shall do all cutting, patching and restoration required by its work, unless otherwise particularly specified in the Specifications.
- B. Restore Work: The Contractor shall restore any work damaged during the performance of the work.
- 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. Structural Elements: Do not cut and patch structural elements without the prior approval, in writing, of the Resident Engineer.
- E. Operational Elements: Do not cut and patch operating elements and related components.
- F. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Commissioner's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- G. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.
- H. Removals: The Contractor must remove from the premises all demolished materials of every nature or description resulting from cutting, patching and restoration work, in accordance with the requirements hereinafter stipulated under Sub-Section 3.17 herein and as further required in Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.15

3.15 LOCATION OF PARTITIONS:

- A. Within three (3) weeks after the concrete slabs have been poured on each floor level, the Contractor shall immediately locate accurately all of the partitions, including the door openings, on the floor slabs in a manner approved by the Resident Engineer.

3.16 FURNITURE AND EQUIPMENT:

- A. Responsibility: The Contractor is responsible for moving all loose furniture and/or equipment in all areas where the location of such furniture and/or equipment interferes with the proper performance of its work.
- B. Protection: All such furniture and/or equipment must be adequately protected with dust cloths and returned to their original locations when directed to do so by the Resident Engineer.

3.17 REMOVAL OF RUBBISH AND SURPLUS MATERIALS:

- A. Of the waste that is generated during demolition, as many of the waste materials as economically feasible, and as stated here, shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized. Comply with requirements of Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- B. 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.
- C. Location: The Contractor shall clean Project site and work area daily and sweep up and deposit, at a location designated on each floor, all of its rubbish, debris and waste materials, as it accumulates and when directed by the Resident Engineer. Wood crating shall be broken up, neatly bundled, tied and stacked ready for removal and be deposited at a location designated on each floor.
 - 1. Comply with requirements in NYC Fire Department for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees F (27 degrees C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- D. Laborers: The Contractor 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 crating 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.
- E. Surplus Materials: The Contractor shall remove from the site all surplus materials when there is no further use for same.
- F. Tools And Materials: At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly removed.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

3.18 CLEANING:

- A. The Contractor 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 up to date of Final Acceptance.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.



- E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration up to date of Final Acceptance.
- F. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration up to date of Final Acceptance.

3.19 SECURITY AND PROTECTION OF WORK SITE:

- A. Provide protection of installed work, including appropriate protective coverings and maintain conditions that ensure installed Work is without damage or deterioration up to date of Final Acceptance.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.
- C. Secure and protect work and work site against damage, loss, injury, theft and/or vandalism.
- D. Maintain daily sign-in sheets of workers and visitors and make the sheets available to the Commissioner

3.20 MAINTENANCE OF SITE AND ADJOINING PROPERTY:

- A. The Contractor shall take over and maintain the Project site, after order to start work.
- B. 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. until the date of Final Acceptance. The Contractor shall, at its own expense, except as otherwise specified, protect same and maintain them in at least as good a condition as that in which the Contractor finds them.
- C. All pavements, sidewalks, roads and approaches to fire hydrants shall be kept clear at all times, maintained and repaired to serviceable condition with materials to match existing.
- D. Provide and keep in good repair all bridging and decking necessary to maintain vehicular and pedestrian traffic.
- E. The Contractor shall also remove all snow and ice as it accumulates on the sidewalks within the Contract Limits Lines.

3.21 MAINTENANCE OF PROJECT SITE:

- A. The Contractor shall take over and maintain all project areas, after order to start work.
- B. Until the date of Final Acceptance, 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.
- C. 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.
- D. The Contractor shall keep the space for the Resident Engineer in a clean condition.

3.22 SAFETY PRECAUTIONS FOR CONTROL CIRCUITS:

- A. Control circuits, the failure of which will cause a hazard to life and property, shall comply with the New York City Dept. of Buildings, Bureau of Electrical Control requirements.

3.23 OBSTRUCTIONS IN DRAINAGE LINES:

- A. 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.

END OF SECTION 01 73 00



SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This section includes administrative and procedural requirements for the management and disposal of construction waste and includes the following requirements:
1. Waste Management Goals
 2. Waste Management Plan
 3. Progress Reports
 4. Progress Meetings
 5. Management Plan Implementation
- B. This Section includes:
1. Definitions
 2. Waste Management Performance Requirements
 3. Reference Resources
 4. Submittals
 5. Quality Assurance
 6. Waste Plan Implementation
 7. Additional Demolition and Salvage Requirements
 8. Disposal

1.3 RELATED SECTIONS: Include without limitation the following:

- | | | |
|----|------------------|--|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 31 00 | PROJECT MANAGEMENT AND COORDINATION |
| C. | Section 01 32 00 | CONSTRUCTION PROGRESS DOCUMENTATION |
| D. | Section 01 73 00 | EXECUTION |
| E. | Section 01 77 00 | CLOSEOUT PROCEDURES |
| F. | Section 01 78 39 | CONSTRUCTION RECORD DOCUMENTS |
| G. | Section 01 81 13 | SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS |

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- C. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk or the like.



- D. Construction and Demolition Waste: Solid wastes typically including building materials, trash debris and rubble resulting from remodeling, repair and demolition operations. Hazardous materials and land clearing waste are not included.
- E. 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.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product.
- G. 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.
- H. Return: To give back reusable items or unused products to vendors.
- I. Reuse: To reuse excess or discarded construction material in some manner on the Project site.
- J. Salvage: To remove a waste material from the Project site for resale or reuse.
- K. 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.
- L. 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.

1.5 WASTE MANAGEMENT PERFORMANCE 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 waste that is generated during demolition, 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.5 C

- C. LEED CERTIFICATION: The City of New York will seek LEED (Leadership in Energy and Environmental Design) certification for this Project as indicated in the Addendum to the General Conditions from the U.S. Green Building Council. The documentation required here will be used for this purpose. LEED awards points for a variety of sustainable design measures on a project, one of which is the reuse and recycling of project waste.
- D. DIVERSION REQUIREMENTS. A minimum of 75% of total Project demolition waste (by weight) shall be diverted from landfill. The following waste categories are likely candidates to be included in the diversion plan as applicable for this project:
 - 1. Concrete
 - 2. Bricks
 - 3. Concrete masonry units (CMU)
 - 4. Asphalt
 - 5. Metals (e.g. banding, stud trim, ceiling grid, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, brass, bronze)



6. Clean dimensional wood
 7. Carpet and pad
 8. Drywall
 9. Ceiling tiles
 10. Cardboard, paper and packaging
 11. Reuse items indicated on the Drawings and/or elsewhere in the Specification
- 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.

1.6 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 materials 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. DDC's Sustainable Design web site:
http://www.nyc.gov/html/ddc/html/design/sustainable_home.shtml This includes a manual on Construction and Demolition Waste Reduction and Recycling, a Sample Waste Management Plan and sample C&D Waste Management log. A standard Construction and Demolition Waste Management Log form is included at the end of this section.
 2. Web Resources
(Information only; no warranty or endorsement is implied.)
www.wastematch.org Site of New York Waste Match, a materials exchange database and service
www.bignyc.org Site of Build It Green NYC, a non profit outlet for salvaged and surplus building materials
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
www.epa.gov/epawaste/index.htm Site of the U.S. Environmental Protection Agency that discusses construction and demolition waste issues, and links to other resources.

1.7 SUBMITTALS:

- A. The Contractor shall be responsible for the development and implementation of a Waste Management Plan for the Project. The Contractor's subcontractors shall assist in the development of that Plan, and collect and deposit their waste and recyclable materials in accordance with the approved Plan.
- B. DRAFT WASTE MANAGEMENT PLAN. Within fifteen (15) days after receipt of 'Notice to Proceed', or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Commissioner a Draft Waste Management Plan. Include separate sections for demolition and construction waste. The Plan shall demonstrate how the performance goals will be met, and contain the following:



1. List of materials targeted for reuse, salvage, or recycling, and names, addresses, and phone numbers of receiving facilities/companies that will be purchasing or accepting each material.
 2. Description of onsite and/or offsite sorting methods for all materials to be removed from site.
 3. If mixed construction and demolition waste is to be sorted off-site, provide a letter from the processor stating the average percentage of mixed construction and demolition waste they recycle.
 4. Landfill information: Names of landfills where non-recyclable/reusable/salvageable waste will be disposed, and list of applicable tipping fees.
 5. Materials handling procedures: A description of the means by which any-recyclable, salvaged, or reused materials will be protected from contamination, and collected in a manner that will meet the requirements for acceptance by the designated recycling processors.
 6. Transportation: A description of the means of transportation and destination for recycled materials.
 7. Meetings: Description of regular meetings to be held to address waste management.
 8. Sample spreadsheet and description of how the implementation of the plan will be documented on a monthly basis.
- C. **FINAL WASTE MANAGEMENT PLAN.** Within fifteen (15) days of Commissioner's approval of the Draft Plan, the Contractor shall submit a Final Waste Management Plan.
- D. **PROGRESS REPORTS.** The Contractor shall submit monthly a 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. A DDC C&D Waste Management Log form is available on the DDC Sustainable Design website and included at the end of this section. For each shipment of material removed from the site, provide the following:
 - a. Date and ticket number of removal
 - b. Identity of material hauler
 - c. Material Category
 - d. Total quantity of waste, in tones/cubic yards, by type
 - e. Quantity of waste salvaged, recycled and/or reused, by type
 - f. Total quantity of waste diverted from landfill (recycled, salvaged, reused) as a percentage of total waste
 - g. Recipient of each material type
 3. Provide monthly and cumulative project totals of waste, quantity diverted, and percentage diverted.
 4. Note that the unit of measure may be either tons or cubic yards, but must be consistent for all shipments and all materials throughout the project. Reports with inconsistent or mixed units will not be reviewed and will be returned for re-submission.
 5. Include legible copies of on-site logs, weight tickets and receipts. Receipts shall be from charitable organizations, recycling and/or disposal site operators who can legally accept the materials for the purpose of reuse, recycling or disposal. Contractor shall save such original documents for the life of the project plus seven (7) years.
- E. **LEED Submittal:** For LEED designated projects submit LEED Letter Template for Credit 2.2, signed by the Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- F. **Refrigerant Recovery.** Submit Qualification data for Refrigerant recovery technician. Statement of refrigerant recovery, signed by the 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.

1.8 QUALITY ASSURANCE:

- A. The Contractor shall designate a Waste Management Coordinator, to ensure compliance with this section. Coordinator shall be present at Project site full time for the duration of the project.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste management plans, documentation and implementation shall be discussed at the following meetings:
 - 1. Pre-demolition kick-off meeting
 - 2. Pre-construction kick-off meeting
 - 3. Regular job-site meetings
 - 4. Contractor toolbox meetings

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 WASTE PLAN IMPLEMENTATION:

- A. The Contractor shall implement the Waste Management Plan, coordinate the Plan with all affected trades, and designate one individual as the Construction Waste Management Representative, who will be responsible for communicating the progress of the Plan with the Commissioner on a regular basis, and for assembling the required LEED documentation.
- B. The Contractor 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 approved Waste Management Plan. The Contractor shall oversee and document the results of the Plan. Monies received for salvaged materials shall remain with the Contractor, except the monies for those items specifically identified elsewhere in the specifications, or indicated on the drawings as belonging to others.
- C. Responsibilities of Subcontractors: Each subcontractor shall be responsible for collecting its waste, non-returned surplus materials, and rubbish, in accordance with the Waste Management Plan.
- D. Distribution. The Contractor shall distribute copies of the Waste Management Plan to each Subcontractor, Resident Engineer, Construction Manager, and Commissioner.
- E. Instruction: The Contractor shall provide on-site instruction of proper waste management procedures to be used by all parties in appropriate stages of the Project.
- F. Procedures. Conduct waste management operations to ensure minimum interference with site vegetation, roads, streets, walks and other adjacent occupied and used facilities.
 - 1. Collect co-mingled waste and/or separate all recyclable waste in accordance with the Plan. Specific areas on the Project site are to be designated, and appropriate containers and bins clearly marked with acceptable and unacceptable materials.
 - 2. Inspect containers and bins for contamination and remove contaminated materials if found.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITION
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
Revised - January 15, 2015

3. Comply with the General Conditions for controlling dust and dirt, environmental protection, and noise control.

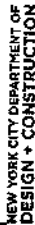
3.2 ADDITIONAL DEMOLITION AND SALVAGE REQUIREMENTS:

- A. Demolition and salvage of additional items indicated in other sections of the Project Specifications require special attention as part of the overall 75 % diversion from landfill. Specific requirements for special attention are designated in other sections of the Project Specifications.

3.3 DISPOSAL:

- A. General. Except for items or material to be salvaged, recycled or otherwise reused, remove waste material from the Project site and legally dispose of them in a manner acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning. Do not burn waste materials
- C. Disposal. Transport waste materials off Project Site and legally dispose of them.

END OF SECTION 01 74 19



CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT LOG

Project I.D.:

For Month:

[illegible]

Cumulative Totals

% Diverted to Date

Notes:

1. Volume (cubic yards) may be used instead of weight if used for ALL amounts and ALL materials.
2. Includes concrete; bricks; concrete masonry units (CMU); asphalt; metals; clean dimensional wood; carpet and pad; drywall; ceiling tiles; cardboard, paper, and packaging; and any other reuse items indicated on the Drawings and/or elsewhere in the Specification.
3. Excluded material includes soil or land clearing debris.
4. Diverted material includes recycled and reused material diverted from landfill. Recycled material is reprocessed into new products. Reused material is reclaimed, salvaged or otherwise used in its original form, either on-site or off-site. These items must be listed in order to receive LEED credit.

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT LOG



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

No Text



SECTION 01 77 00
CLOSEOUT PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes administrative and general procedural requirements for Closeout Procedures, including without limitation the following:
1. Definitions
 2. Substantial Completion
 3. Final Acceptance
 4. Warranties
 5. Final Cleaning
 6. Repair of the Work
- B. LEED: Refer to the Addendum to identify whether this project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS."
- C. COMMISSIONING: Refer to the Addendum to identify whether this project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning shall be in accordance with ASHRAE and USGBC LEED- NC procedures, as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS. The Contractor shall cooperate with the commissioning agent and provide whatever assistance is required.

1.3 RELATED SECTIONS: include without limitation the following:

- | | | |
|----|------------------|--|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 33 00 | SUBMITTAL PROCEDURES |
| C. | Section 01 74 19 | CONSTRUCTION WASTE MANAGEMENT & DISPOSAL |
| D. | Section 01 78 39 | CONTRACT RECORD DOCUMENTS |
| E. | Section 01 79 00 | DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION |

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or



combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

- C. Substantial Completion: shall mean the written determination by the Commissioner that the Work required under the Contract is substantially, but not entirely, complete.
- D. Final Acceptance: shall mean final written acceptance of all the Work by the Commissioner, a copy of which shall be sent to the Contractor.

1.5 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection to determine the date of Substantial Completion, the Contractor shall complete and supply all items required by the contract specifications, General Conditions, Addendum to the General Conditions, change orders or other directives from the Commissioner's representatives. The required items will include all contract requirements for substantial completion, including but not limited to items related to releases, regulatory approvals, warranties and guarantees, record documents, testing, demonstration and orientation, final clean up and repairs, and all specific checklist of items by the Resident Engineer. (See Attachment "A" at the end of this section for sample requirements for Substantial Completion).
- B. Prepare and submit a list to the Resident Engineer of incomplete items, the value of incomplete construction, and reasons the work is not complete.
- C. Inspection: The Contractor shall submit to the Resident Engineer a written request for inspection for Substantial Completion. Within ten (10) days of receipt of the request, the Resident Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. The Resident Engineer may request the services, as required, of the Design Consultant, Client Agency Representative and/or other entities having involvement with the Work to assist in the inspection of the Work. If the Resident Engineer makes a determination that the work is substantially complete and approves the Final Punch List and the date for Final Acceptance, he/she will so advise the Commissioner and recommend issuance of the Certificate of Substantial Completion. If the Resident Engineer determines that the work is not substantially complete, he/she will notify the Contractor of those items that must be completed or corrected before the Certificate of Substantial Completion will be issued.
 - 1 Re-inspection: Contractor shall request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2 Results of completed inspection will form the basis of requirements for Final Acceptance.

1.6 FINAL ACCEPTANCE:

- A. Preliminary Procedures: Before requesting final inspection for Final Acceptance of the Work, the Contractor shall complete the following. (Note that the following are to be completed, submitted as appropriate, and approved by the Commissioner, as applicable, prior to the final inspection and are not to be submitted for approval or otherwise at the final inspection unless specifically indicated). List exceptions in the request.
 - 1. Verify that all required submittals have been provided to the Commissioner including but not limited to the following:
 - a. Manufacturer's cleaning instructions
 - b. Posted instructions
 - c. As-built Record Documents (Drawings, specifications, and product data) as described in Section 01 78 39, CONTRACT RECORD DOCUMENTS, incorporating any changes required by the Commissioner as a result of the review of the submission prior to the pre-final inspection.
 - d. Operation and Maintenance Manuals, including Preventive Maintenance, Special Tools, Repair Requirements, Parts List, Spare Parts List, and Operating Instructions.



- e. Completion of required Demonstration and Orientation, as applicable, of designated personnel in operation and maintenance of systems, sub-systems and equipment.
 - f. Applicable LEED Building submittals as described in Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS.
 - g. Construction progress photographs as described in Section 01 32 33, PHOTOGRAPHIC DOCUMENTATION.
- 2. Submit a certified copy of the final approved Punch List of items to be completed or corrected. The certified copy of the Punch List shall state that each item has been completed or otherwise resolved for acceptance, and shall be endorsed and dated by the Contractor.
 - 3. Submit pest-control final inspection report and survey as required in Section 01 50 00, TEMPORARY FACILITIES AND CONTROLS.
 - 4. Submit record documents and similar final record information.
 - 5. Deliver tools, spare parts, extra stock and similar items.
 - 6. Complete final clean-up requirements including touch-up painting of marred surfaces.
 - 7. Submit final meter readings for utilities, as applicable, a measured record of stored fuel, and similar data as of the date when the City took possession of and assumed responsibility for corresponding elements of the work.
- B. Final Inspection: The Contractor shall submit to the Resident Engineer a written request for inspection for Final Acceptance of the Work. Within ten (10) days of receipt of the request, the Resident Engineer will either proceed with inspection or notify the Contractor of unfulfilled requirements. The Resident Engineer may request the services, as required, of the Design Consultant, Client Agency Representative and/or other entities having involvement with the Work to assist in the inspection of the Work. If the Resident Engineer finds that all items on the Final Approved Punch List are complete and no further work remains to be done, he/she will so advise the Commissioner and recommend the issuance of the determination of Final Acceptance. If the Resident Engineer determines that the work is not complete, he/she will notify the Contractor of those items that must be completed or corrected before the determination of Final Acceptance will be issued.
- C. Final Acceptance: The Work will be accepted as final and complete as of the date of the Resident Engineer's inspection if, upon such inspection, the Resident Engineer finds that all items on the Punch List are complete and no further Work remains to be done. The Commissioner will then issue a written determination of Final Acceptance.

1.7 WARRANTIES:

- A. The items of materials and/or equipment for which manufacturer warranties are required are listed in Schedule B of the Addendum. For each item of material and/or equipment listed in Schedule B, 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 in Schedule B and will be replaced or repaired within such specified period. The contractor shall deliver all required warranties to the Commissioner.
- B. Unless indicated otherwise Warranties are to take effect on the date of Substantial Completion.
- C. Submittal Time: Submit written Warranties on request of the Commissioner for designated portions of the Work where commencement of Warranties other than date of Substantial Completion is indicated.
- D. Partial Occupancy: Submit properly executed Warranties to the Commissioner within 15 days of completion of designated portions of the Work that are completed and occupied or used by the City.
- E. Organize the Warranty documents into an orderly sequence based on the Project Specification Divisions and Section Numbers.



1. Bind Warranties in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES;" name and location of Project; Capitol Budget Project Number (FMS ID); and Contractor's and applicable subcontractor's name and address.
 3. Provide heavy paper dividers with plastic-covered tabs for each separate Warranty. Mark tab to identify the product or installation.
 4. Provide a typed description of each product or installation being warranted, including the name of the product, and the name, address, and telephone number of the Installer.
- F. When warranted materials and/or equipment require operation and maintenance manuals, provide additional copies of each required Warranty in each required manual. Refer to Section 01 78 39, CONTRACT RECORD DOCUMENTS, for requirements of Operation and Maintenance Manuals.

PART II – PRODUCTS

2.1 MATERIALS:

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART III – EXECUTION

3.1 FINAL CLEANING:

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations, as applicable, before requesting inspection for Final Acceptance of the Work for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.



- j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
 - t. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests, as required in Section 01 50 00, TEMPORARY FACILITIES, SERVICES AND CONTROLS. Prepare and submit a Pest Control report to the Commissioner.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on City's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.2 REPAIR OF THE WORK:

- A. Subject to the terms of the Contract the Contractor shall complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Contractor shall repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS

Issue Date - June 01, 2013

Revised - January 15, 2015

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

CLOSEOUT PROCEDURES

01 77 00 -6



SECTION 01 77 00

ATTACHMENT 'A'

The following list is a general sample of Substantial Completion requirements, including but not limited to:

1. Prepare and submit a list to the Resident Engineer, of incomplete items, the value of incomplete construction, and reasons the work is not complete.
2. Obtain and submit any necessary releases enabling the City unrestricted use of the project and access to services and utilities.
3. Regulatory Approvals: Submit all required documentation from applicable Governing Authorities, including, but not limited to, Department of Buildings (DoB); Department of Transportation (DoT); Department of Environmental Protection (DEP); Fire Department (FDNY); etc. Documentation to include, but not limited to, the following:
 - a. Building Permits, Applications and Sign-offs.
 - b. Permits and Sign-off for construction fences; sidewalk bridges; scaffolds, cranes and derricks; utilities; etc.
 - c. Certificates of Inspections and Sign-offs.
 - d. Required Certificates and Use Permits.
 - e. Certificate of Occupancy (C.O.), Temporary Certificate of Occupancy (T.C.O.) or Letter of Completion as applicable.
4. Submit specific warranties required by the specifications, final certifications, and similar documents.
5. Prepare and submit Record Documents as described in Section 01 78 39, **CONTRACT RECORD DOCUMENTS**, including but not limited to; approved documentation from Governing Authorities; as-built record drawings and specifications; product data; operation and maintenance manuals; Final Completion construction photographs; damage or settlement surveys; final property surveys; and similar final record information. The Resident Engineer will review the submission and provide appropriate comments. If comments are significant the initial submission will be returned to the Contractor for correction and re-submission incorporating the comments prior to the Final Inspection.
6. Record Waste Management Progress Report: Submit C&D Waste Management logs, with legible copies of weight tickets and receipts required in accordance with Section 01 74 19, **CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**.
7. If applicable submit LEED Letter Template in accordance with the requirements of Section 01 81 13, **SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS**.
8. Schedule applicable Demonstration and Orientation required in other Sections of the Project Specifications and as described in Section 01 79 00, **DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION**.
9. Deliver tools, spare parts, extra materials, and similar items to location designated by Resident Engineer. Label with manufacturer's name and model number where applicable.
10. Make final changeover of permanent locks and deliver keys to the Resident Engineer. Advise Commissioner of changeover in security provisions.
11. Complete startup testing of systems as applicable.
12. Submit approved test/adjust/balance records.
13. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements as directed by the Resident Engineer.
14. If applicable complete Commissioning requirements as defined in Section 01 91 13, **GENERAL COMMISSIONING REQUIREMENTS**.
15. Complete final cleaning requirements, including touchup painting.
16. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.



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SECTION 01 78 39
CONTRACT RECORD DOCUMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes administrative and general procedural requirements for Contract Record Documents, including:
1. As-built Contract Record Drawings.
 2. As-built marked-up copies of Record Specifications, addenda and Change Orders.
 3. As-built marked-up Product Data
 4. Record Samples
 5. Construction Record Photographs
 6. Operating and Maintenance Manuals
 7. Final Site Survey
 8. Guarantees and Warranties
 9. Waste Disposal Documentation
 10. LEED Materials and Matrix
 11. Miscellaneous Record Submittals
- B. The Department of Design and Construction, at the start of construction (kick-off meeting), will furnish to the Contractor at no cost a complete set of Contract Drawings Mylars (reproducible) pertaining to the work to be performed under the Contract. It is the responsibility of the Contractor to modify the Contract Drawings to indicate all changes and corrections, if any, occurring in the work as actually installed. The Contractor is required to furnish all other Mylar (reproducible) drawings, if necessary, such as Addenda Drawings and Supplementary Drawings as may be necessary to indicate all work in detail as actually completed. All professional seals must be blocked out. Title box complete with project title and Design Consultants' names will remain.
- C. Maintenance of Documents and Samples: The Contractor shall maintain, during the progress of the work, an accurate record of the work as actually installed, on Contract Record Drawings, on Mylar (reproducible), in ink. Store record documents and samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make documents and samples available at all times for the Resident Engineer's inspections.

The Contractor's attention is particularly directed to the necessity of keeping accurate records of all subsurface and concealed work, so that the Contract Record Drawings contain this information in exact detail and location. Contract Record Drawings shall also show all connections, valves, gates, switches, cut-outs and similar operating equipment.

For projects designated to achieve a LEED rating the Contractor shall receive a copy of the project's LEED scorecard for the purpose of monitoring compliance with the target objectives and to facilitate coordination with the LEED Consultant. The Contractor shall receive periodic updates of this scorecard,



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and is required to submit the final version of the Scorecard at Substantial Completion with other project Record Documents.

1.3 RELATED SECTIONS: include without limitation the following:

- | | | |
|----|------------------|-------------------------------------|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 32 00 | CONSTRUCTION PROGRESS DOCUMENTATION |
| C. | Section 01 32 33 | PHOTOGRAPHIC DOCUMENTATION |
| D. | Section 01 33 00 | SUBMITTAL PROCEDURES |
| E. | Section 01 77 00 | PROJECT CLOSEOUT PROCEDURES |

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

A. As-Built Contract Record Drawings: Comply with the following:

1. Progress Submission: As directed by the Resident Engineer, submit progress As-Built Contract Record Drawings at the 50% Construction Completion stage.
2. Final Submission: Before substantial completion payment, the Contractor shall furnish to the Commissioner one (1) complete set of marked-up Mylar (reproducible) As-Built Contract 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 the sponsoring agency by DDC.
3. As-Built Contract 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 for binding.
4. Each As-Built Contract Record Drawing shall bear the legend "AS-BUILT CONTRACT RECORD DRAWING" in heavy block lettering, one half (1/2) inch high, and contain the following data:

AS-BUILT CONTRACT RECORD DRAWING

Contractor's Name	_____
Contractor's Address	_____
Subcontractor's Name (where applicable)	_____
Subcontractor's Address	_____
Made by:	_____
Checked by:	_____
Date	_____
Date	_____

Commissioner's Representatives	
(Resident Engineer)	DDC
(Plumbing Inspector)	DDC
(Heating & Ventilating Inspector)	DDC
(Electrical Inspector)	DDC



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5. Record Drawing Title Sheet: The Contractor shall prepare a title sheet, the same size as the Contract Record Drawings, which shall contain the following:
 - a. Heading:
The City of New York
Department of Design and Construction
Division of Public Buildings
 - b. Capital Budget Project Number (FMS ID)
 - c. Name and Location of Project
 - d. Contractor's Name and Address
 - e. Subcontractor's Name and Address (where applicable)
 - f. Record of changes (a caption description of work affected, and the date and number of Change Order or other authorization)
 - g. List of Record Drawings
- B. Record Specifications, Addenda and Change Order: Submit to the Commissioner two (2) copies each of marked-up Record Specifications, Addenda and Change Orders.
- C. Record Product Data: Submit to the Commissioner two (2) sets of Record Product Data.
- D. Record Construction Photographs: Submit to the Commissioner final as-built construction photographs and negatives of the completed work as described in Section 01 32 33, PHOTOGRAPHIC DOCUMENTATION.
- E. Operating and Maintenance Manuals:
 1. Submit three (3) copies each of preliminary manuals to the Resident Engineer for review and approval. The Contractor shall make such corrections, changes and/or additions to the manual until deemed satisfactory by the Resident Engineer. Deliver three (3) copies of the final approved manuals to the Resident Engineer for distribution.
 2. Commissioning: Comply with the requirements of Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS, as well as the requirements set forth in sections of the Project Specifications, for projects designated for Commissioning. Submit four (4) copies each of data designated to be included in the Commissioning Operation and Maintenance Manual to the Resident Engineer. The Resident Engineer will forward such data to the Commissioning Authority/Agent (CxA) for review and comment. The Contractor shall make such corrections, changes and/or additions to the data until deemed satisfactory and deliver four (4) copies of the final data to the Resident Engineer for use by the Commissioning Authority/Agent (CxA) to prepare the Commissioning Operation and Maintenance Manual.
 - a. Non-Commissioning Data: All remaining data not designated for Commissioning and required as part of Maintenance and Operation Manual shall be prepared and assembled in accordance with the requirements of this section for Operating and Maintenance Manuals.
- F. Final Site Survey: Submit Final Site Survey as described in Section 01 73 00, EXECUTION, in quantities requested by the Commissioner, signed and sealed by a Land Surveyor licensed in the State of New York.
- G. Guarantees and Warranties.
- H. Waste Disposal Documents and Miscellaneous Record Documents.



PART II – PRODUCTS

2.1 CONTRACT RECORD DRAWINGS:

- A. Record Prints: The Contractor shall maintain one set of blue- or black-line white prints as applicable of the Contract Drawings and Shop Drawings. If applicable, the Record Contract Drawings and Shop Drawings shall incorporate the arrangement of the work based on the accepted Master Coordination Drawing(s) as described in Section 01 33 00, SUBMITTAL PROCEDURES.
1. Preparation: The Contractor shall mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Change Orders: All changes from Contract Drawings 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.
- B. Content: Types of items requiring marking include, but are not limited to, the following:
1. Dimensional changes to Drawings.
 2. Revisions to details shown on Drawings.
 3. Depths of foundations below first floor.
 4. Locations and depths of underground utilities.
 5. Revisions to routing of piping and conduits.
 6. Revisions to electrical circuitry.
 7. Actual equipment locations.
 8. Duct size and routing.
 9. Locations of concealed internal utilities.
 10. Changes made by Change Order
 11. Changes made following Commissioner's written orders.
 12. Details not on the original Contract Drawings.
 13. Field records for variable and concealed conditions.
 14. Record information on the Work that is shown only schematically.
- C. Progress Record Mylar's (reproducible): As directed by the Resident Engineer at 50% construction completion, review marked-up Record Prints with the Resident Engineer and the Design Consulting. When directed by the Resident Engineer transfer progress mark-ups to a full set of Mylar's (reproducible) and submit one blue line or black line record copy to the Resident Engineer. The marked-up Mylar's (reproducible) shall be retained by the contractor for completion of mark-up and final submission.
- D. Final Contract Record Mylar's (reproducible): Immediately before final inspection for Certificate of Substantial Completion, review marked-up Record Prints with the Resident Engineer and the Design Consulting. When authorized, complete mark-up of a full set of corrected Mylar's (reproducible) of the Contract Drawings.
1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
 2. Refer instances of uncertainty to Resident Engineer for resolution.
 3. Print the As-Built Contract Drawings and Shop Drawings for use as Record Transparencies as described in Sub-Section 1.5.



2.2 RECORD SPECIFICATIONS, ADDENDA AND CHANGE ORDERS:

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 5. Note related Change Orders and Record Drawings where applicable.
 6. Upon completion of mark-up, submit two (2) complete copies of the marked-up Record Specifications to the Commissioner.

2.3 RECORD PRODUCT DATA:

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. If possible, a Change Order proposal should include resubmitting updated Product Data. This eliminates the need to mark up the previous submittal.
 4. Note related Change Orders and Record Drawings where applicable.
 5. Upon completion of mark-up submit to the Commissioner two (2) sets of the marked-up Record Product Data.
 6. Where Record Product Data is required as part of Maintenance Manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data.

2.4 RECORD SAMPLE SUBMITTAL:

- A. Prior to the date of Substantial Completion, the Contractor shall meet with the Resident Engineer at the site to determine which of the Samples maintained during the construction period shall be transmitted to the Commissioner for record purposes.
- B. Comply with the Resident Engineer's instructions for packaging, identification marking and delivery to DDC. Dispose of other samples as specified for disposal of surplus and waste material.

2.5 OPERATING AND MAINTENANCE MANUALS:

- A. The Contractor shall provide preliminary and final versions of Operating and Maintenance Manuals required for those systems, equipment and materials listed in other Sections of the Project Specifications.
- B. Format: Prepare and assemble Operation and Maintenance Manuals in heavy-duty, 3-ring, hardback loose leaf binders in the form of an instructional manual. All binders for each discipline shall be the same color. When multiple binders are used, correlate data into related consistent groupings. Binder front shall contain permanently attached labels displaying the following:



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1. Heading:
The City of New York
Department of Design and Construction
Division of Public Buildings
 2. Capital Budget Project Number (FMS ID)
 3. Name and Location of Project
 4. Contractor's name and Address
 5. Subcontractor's Name and Address (where applicable)
 6. Dates of the work covered by the contents of the Project Manual.
 7. Binder spine shall display Project Number (FMS ID) and date of completion.
- C. Organization: Include a section in the directory for each of the following:
1. List of documents
 2. List of systems
 3. List of equipment
 4. Table of contents
- D. Arrange content by systems under Specification Section numbers and sequence of Table of Contents of the Project manual. Provide tabbed flyleaf for each separate product, equipment and/or system/subsystem with typed description of product and major component parts of equipment.
- E. Safety warnings or cautions shall be visibly highlighted within each maintenance procedure. Use of such highlights shall be limited to only critical items and shall not be used in an excessive manner which would reduce their effectiveness.
- F. For each product or system, list names, addresses and telephone numbers of Subcontractors and Suppliers, including local source of supplies and replacement parts. Vendors and Supplier listings are to include names, addresses and telephone numbers, including nearest field service telephone numbers.
- G. Where contents of the manual include any manufacturer's catalog pages, clearly indicate the precise items and options included in the installation and delete all manufacturers' data regarding products not included in the installation.
- H. All material within manuals shall be new. Copies used for prior submittals or used in construction shall not be used.
- I. Submit preliminary and final manual editions to the Commissioner according to the approved progress schedule.
- J. Manuals shall present all technical material to the greatest extent possible, with respect to text, tabular matter and illustrations. Illustrations shall preferably consist of line drawings. All applicable drawings shall be included. If available, color photograph prints may be included.
- K. Preliminary manual editions shall be as technically complete as the final manual edition. All illustrations shall be in final forms.
- L. Final manual editions shall be technically accurate and complete and shall represent all "as-built" systems, pieces of equipment, or materials, which have been accepted by the Commissioner. All illustrations, text and tabular material shall be in final form. All shop drawings shall be included as specified in individual Specification Sections.
- M. Building products, applied materials, and finishes: Include product data, with catalog number, size, composition, and color texture designations. Where applicable, provide information for re-ordering custom manufactured products.
- N. Instructions for care and maintenance: Include manufacturers' recommendations for cleaning agents and methods, and recommended schedule for cleaning and maintenance.



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- O. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical compositions, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- P. Additional Requirements: Specified in individual Specification Sections.

2.6 DEMONSTRATION AND ORIENTATION DVD:

- A. Non-Commissioned Projects: The Contractor shall submit final version of applicable Demonstration and Training DVD recordings in compliance with Section 01 79 00, DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

2.7 GUARANTEES AND WARRANTIES:

- A. SCHEDULE B – Requirements for guarantees and warranties for the Project are set forth in Schedule B, which is included as part of the Addendum.
- B. FORM – For all guarantee requirements set forth in Schedule B, the Contractor shall provide a written guaranty, in the form set forth herein.
- C. Submit fully executed and signed manufacturers' Warranties as listed in the Project Specifications and outlined in Schedule B of the Addendum. Refer to Section 01 77 00, CLOSEOUT PROCEDURES for submittal requirements.



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GUARANTY

DDC PROJECT # _____

PROJECT DESCRIPTION _____

CONTRACT # _____

SPECIFICATION SECTION # AND TITLE _____

GUARANTY TO BE IN EFFECT FROM _____

TO _____

The Contractor hereby guarantees that the work specified under the above section of the aforesaid Contract will be free from defects of material and/or workmanship, for the period indicated above.

The Contractor also guarantees that it will promptly repair, restore, rebuild or replace whichever may be deemed necessary by the City, any or all defective material or workmanship of the aforementioned section, that may appear within the guaranty period and any finished work to which damage may occur because of such defects, to the satisfaction of the City and without any cost or expense to the City.

The Contractor hereby agrees to pay to the City the cost of the repairs or replacements should the City make the same because of the failure of the Contractor to do so.

Contractor: _____

By: _____
Signature of Partner or Corporate Officer

Print Name: _____

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

Notary Public



2.8 WASTE DISPOSAL DOCUMENTATION:

- A. Certify and deliver to the Commissioner all documentation including reports, receipts, certificates, records etc. for the collection, handling, storage, classification, testing, transportation, recycling and/or disposal of all Non-Hazardous Construction Waste as required by Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, and Hazardous Waste as required by other Project Specification Sections. Certify compliance with all applicable governing laws, codes, rules and regulations.

2.9 MISCELLANEOUS RECORD DOCUMENTS:

- A. Refer to other Project Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Prior to Final Acceptance, complete miscellaneous records and place in good order, properly identified and bound or otherwise organized to allow for use and reference.
- B. Submit three (3) copies of each document to the Commissioner or as otherwise directed by the Commissioner.

PART III – EXECUTION

3.1 RECORDING AND MAINTENANCE:

- A. Recording: Maintain one copy of each submittal during the construction period for Contract Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Contract Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to the Contract Record Documents for the Resident Engineer's reference during normal working hours.

END OF SECTION 01 79 39



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SECTION 01 79 00
DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 79 00

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes administrative and procedural requirements, when set forth in sections of the Project Specifications, for instructing facility's personnel, including the following:
1. Demonstration of operation of systems, subsystems, and equipment.
 2. Owner's Pre-Acceptance Orientation in operation and maintenance of systems, subsystems, and equipment.
 3. Demonstration and Orientation videotapes. (Non-Commissioned Projects)
- B. The Contractor shall provide the services of equipment manufacturers orientation specialists experienced in the type of equipment to be demonstrated.
- C. Separate Orientation sessions shall be conducted for mechanical operations and maintenance personnel and for electronic and electrical maintenance personnel.
- D. Commissioning: Refer to the Addendum to identify whether this project is to be Commissioned. For Commissioned projects the Contractor shall provide Demonstration and Orientation as described in this section and cooperate with the Commissioning Authority/Agent (CxA) to implement Commissioning requirements as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS.

1.3 RELATED SECTIONS: include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 33 00 SUBMITTAL PROCEDURES
- C. Section 01 77 00 CLOSEOUT PROCEDURES
- D. Section 01 78 39 CONTRACT RECORD DOCUMENTS
- E. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS
- F. Specific requirements for demonstration and training indicated in other sections of the Project Specifications

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.



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- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

- A. Instruction Program: Submit three (3) copies of outline of instructional program for demonstration and orientation, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each orientation module to the Commissioner for approval no less than thirty (30) days prior to the date the proposed orientation is to take place. Include learning objectives and outline for each orientation module.
1. At completion of training, submit three (3) complete training manual(s) and three (3) applicable DVD recording(s) to the Commissioner for the facility's and City's use.
- B. Qualification Data: For facilitator, instructor and Videographer.
- C. Attendance Record: For each orientation module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each orientation module, submit results and documentation of performance-based test.
- E. Submit all final orientation material to the Resident Engineer a minimum of fourteen (14) days prior to the scheduled training.
- F. Demonstration and Orientation Recordings:
1. Non-Commissioned Projects:
- a. The Contractor shall submit to the Commissioner three (3) copies of Demonstration and Orientation DVD (Digital Video Disk) recordings within seven (7) days of end of each training module.
- b. Identification: On each copy, provide an applied label with the following information:
- 1) Project Contract I.D. Number
 - 2) Project Contract Name
 - 3) Name of Contractor
 - 4) Name of Subcontractor as applicable
 - 5) Name of Design Consultant
 - 6) Name of Construction Manager as applicable
 - 7) Date recorded.
 - 8) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - 9) Table of Contents including list of systems covered.
- c. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding DVD recording. Include name of Project and date of recording on each page.
2. Commissioned Projects:
- a. Demonstration and Orientation DVD recordings for Commissioned projects will be recorded by the Commissioning Authority/Agent (CxA) under separate contract with the City of New



York. The Contractor performing Demonstration and Orientation shall cooperate with the CxA in the recording of each Demonstration and Orientation module.

1.6 QUALITY ASSURANCE:

- A. Facilitator Qualifications: A firm or individual experienced in orientation or educating maintenance personnel in an orientation program similar in content and extent to that indicated for this Project.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00, QUALITY REQUIREMENTS, experienced in operation and maintenance procedures and orientation.
- C. Videographer Qualifications: A professional Videographer who has experience with orientation and construction projects.
- D. Pre-instruction Conference: Schedule with the Resident Engineer a conference at Project site to comply with requirements in Section 01 31 00, PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to demonstration and orientation including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.7 COORDINATION:

- A. Coordinate instruction schedule with the Resident Engineer and facility's operations. Adjust schedule as required to minimize disrupting facility's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of orientation modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Commissioner.

PART II – PRODUCTS

2.1 INSTRUCTION PROGRAM:

- A. Program Structure: Develop an instruction program that includes individual orientation modules for each system and equipment not part of a system, as specified and required by individual Specification Sections.
- B. Orientation Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.



- d. Regulatory requirements.
 - e. Equipment function including auxiliary equipment and systems.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
2. Documentation: Review the following items in detail:
- a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties
3. Emergencies: Include the following, as applicable:
- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning



- e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
 - h. Housekeeping practices
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART III – EXECUTION

3.1 INSTRUCTION:

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and the Resident Engineer for the number of participants, instruction times, and location.
- B. The Contractor shall engage qualified instructors to instruct facility's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Schedule instruction with the Resident Engineer at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule orientation with the Resident Engineer with at least fourteen (14) days' advance notice.
- D. Evaluation: At conclusion of each orientation module, assess and document each participant's mastery of module(s) by use of an oral a written or a demonstration performance-based test.
- E. Cleanup: Collect and remove used and leftover educational materials from project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial orientation use.

3.2 DEMONSTRATION AND ORIENTATION RECORDINGS:

- A. Non-Commissioned projects:
 - 1. The Contractor shall engage a qualified commercial Videographer to record demonstration and orientation sessions. Record each orientation module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 2. At beginning of each orientation module, record each chart containing learning objective and lesson outline.
 - 3. All recordings must be close captioned.
 - 4. Recording Format: Provide high-quality DVD (Digital Video Disk) format.
 - 5. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and orientation. Display continuous running time.
 - 6. Narration: Describe scenes on the recording by audio narration by microphone while recording or by dubbing audio narration off-site after. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.



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7. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from opposite the corresponding narration segment.

B. Commissioned Projects:

Refer to the Addendum to determine if the project is to be Commissioned.

1. The Commissioning Authority/Agent (CxA) under separate contract with the City of New York will assess and comment on the adequacy of the Orientation Instruction sessions by reviewing the Orientation and Instruction program and agenda provided by each contractor. The provider of the Orientation program will videotape the sessions and provide a copy to the CxA for final review and comments. If necessary, Contractor shall edit the DVD recording per CxA comments.

END OF SECTION 01 79 00



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SECTION 01 81 13
SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York is committed to implementing good environmental practices and procedures which include achieving a LEED™ Green Building rating. Specific project requirements related to this goal are listed in the applicable paragraphs of this section of the General Conditions. The Contractor shall ensure that these requirements as defined in the sections below and in related sections of the Contract Documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. This Section includes:

1. Definitions
2. LEED Provisions
3. LEED Building Submittals
4. LEED Building Submittal Requirements
5. LEED Action Plan

1.3 RELATED SECTIONS: Include without limitation the following:

- | | | |
|----|---------------------|--|
| A. | Section 01 74 19 | CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL |
| B. | Section 01 81 13.13 | VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES,
SEALANTS, PAINTS AND COATINGS |
| C. | Section 01 81 19 | INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS |
| D. | Section 01 91 13 | GENERAL COMMISSIONING REQUIREMENTS |

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Agrifiber Products: Products derived from recovered agricultural waste fiber from sources such as cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings, processed and mixed with resins to produce panels with characteristics similar to composite wood.



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- C. **Composite Wood:** Products composed of wood or plant particles or fibers bonded by a synthetic resin or binder to produce panels such as plywood, particleboard, and medium density fiberboard (MDF). Does not include hardboard, structural panels, glued laminated timber, prefabricated wood I-joists, or finger-jointed lumber.
- D. **Design Consultant:** "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- E. **Forest Stewardship Council (FSC) Certified Wood:** Wood-based materials and products certified in accordance with the Forest Stewardship Council's principles and criteria.
- F. **LEED:** The Leadership in Energy & Environmental Design rating system developed by the United States Green Building Council.
- G. **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.
- H. **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.
- I. **Regionally Extracted, Harvested, or Recovered Materials:** Materials which are extracted, harvested, or recovered and manufactured within a radius of 500 miles from the Project site.
- J. **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.
 - 3. "Pre-consumer" may also be referred to as "post-industrial".
- K. **Solar Reflectance Index (SRI):** A measure of a material's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is equal to 0, and a standard white (reflectance 0.80, emittance of 0.90) is equal to 100.
- L. **Volatile Organic Compound (VOC):** Any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) which vaporizes (becomes a gas) and participates in atmospheric photochemical reactions, as specified in Part 51.00 of Chapter 40 of the U.S. Code of Federal Regulations, at normal room temperatures. For the purposes of this specification, formaldehyde and acetaldehyde are considered to be VOCs.



1.5 LEED PROVISIONS:

- A. Refer to the Addendum for the LEED rating to be achieved for this project. The provisions to achieve this LEED rating are integrated within the project construction documents and specifications. The Contractor is specifically directed to the "LEED BUILDING Performance Criteria" and "LEED BUILDING Submittals" sections within the contract 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.

1.6 LEED BUILDING SUBMITTALS:

- A. Scope: LEED BUILDING submittals are required for all installed materials included in General Construction work. LEED BUILDING Submittals are only required for field-applied adhesives, sealants, paints and coatings included in Plumbing, Mechanical and Electrical work. Submit all required LEED BUILDING submittals in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Applicability: The extent of the LEED BUILDING Submittals varies depending on the specification section. Applicable LEED BUILDING Submittals are listed under the "LEED BUILDING Submittals" heading in each specification section. The detailed requirements for the LEED BUILDING Submittals are defined in Item C below.
- C. Detailed Requirements: Sub-Sections 1.6 C.1 through 1.6 C.3 below defines the information and documents to be provided for each type of LEED BUILDING Submittal as identified in the LEED Submittal Requirements of each specification section:
1. ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM (EBMCF)[GHI]: Information to be supplied for this form (blank sample copy attached at end of this Section to be modified as appropriate to the project) 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).
 1. For each product with recycled content, also indicate the total recycled content value ($1/2 \times \text{pre-consumer percentage} \times \text{product value} + 1 \times \text{post-consumer percentage} \times \text{product value} = \text{total recycled content value}$).
 2. See additional requirements for concrete below.
 - 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.
 - 1) Indicate the percentage by weight, relative to the total weight of the product that meets these criteria.
 - 2) Indicate the point of harvest/extraction/recovery of regional raw materials, the point of final assembly of regional manufactured products, and the distance from each point to the project site.
 - d. Volatile Organic Compound (VOC) content of all field-applied adhesives, sealants, paints, and coatings, listed in grams/liter or lbs./gallon, less water.
 - 1) For detailed requirements refer to Section 01 81 13.13 VOC LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS.
 - e. The amount of "Forest Stewardship Council (FSC) Certified" wood products if used in the Project.
 - 1) Record only new FSC-certified wood products. Do not record reclaimed, salvaged, or recycled FSC-certified wood products.



- 2) Reclaimed, salvaged, or recycled FSC-certified wood may be recorded as post-consumer recycled content.
 - f. The amount of Rapidly Renewable materials if used in the Project.
 - 1) Indicate the type of rapidly renewable material used, and the percentage by weight, relative to the total weight of the product, that consists of rapidly renewable material.
 - g. The percentage (by weight), relative to the total weight of cementitious materials, of supplementary cementitious materials or pozzolans such as fly ash used in each concrete mix used in the Project.
 - 1) For each concrete mix, provide a complete breakdown of all components, by weight and by cost.
 - h. Identification (Yes/No) of composite wood or agrifiber products used in the project that are free of added urea-added formaldehyde resins.
 - i. Identification (Yes/No) of flooring products used in the project that have Carpet and Rug Institute (CRI) Green Label or Green Label Plus certification, or Resilient Floor Covering Institute FloorScore certification.
 - 1) Untreated solid wood flooring, and mineral-based flooring products such as tile, masonry, terrazzo, and cut stone that have no organic-based coatings or sealants, are excluded from this requirement.
 - j. The EBMCF shall record the above information only for those materials or products permanently installed in the project. The EBMCF shall record VOC content, composite and agrifiber products, and CRI or FloorScore ratings only for those materials or products permanently installed within the weather barrier of the LEED building.
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, less water. 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.
 - d. **RAPIDLY RENEWABLE MATERIALS:** If used in the project, provide published literature or letter of certification on the manufacturer's letterhead certifying the percentage of each product that is rapidly renewable (by weight).
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. **CRI GREEN LABEL PLUS CERTIFICATION:** For carpets and carpet cushions, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the products comply with the "Green Label Plus" IAQ testing program of the Carpet and Rug Institute of Dalton, GA.



5. **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 the products do not contain added urea-formaldehyde resins.
6. **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 the adhesive products do not contain urea-formaldehyde.
7. **FSC-CERTIFIED WOOD:**
 - a. If used in the project, provide chain of custody documents and copies of invoices regarding wood products, including whether or not such wood product is FSC-certified.
 - b. If used in the project, for assemblies, provide the percentage (by cost and by weight) of the assembly that is FSC-certified wood.
 - c. If used in the project, for assemblies, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the percentage that is FSC-certified wood.
8. **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. Interior Architectural Paints and Coatings: 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)
9. **HIGH ALBEDO PAVING AND WALKWAY MATERIALS:** For paving and walkway materials made from concrete or brick provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying a minimum Solar Reflectance Index (SRI) value of 29. 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.
10. **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 $>$ 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.
11. **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.

12. **FLOORSORE CERTIFICATION:** For all hard surface flooring, including vinyl, linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring, and wall base, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the products comply with the current FloorScore standard requirements.
13. **CONCRETE:** Provide concrete mix design for each mix, designated by a distinct identifying code or number and signed by a Professional Engineer licensed in the state in which the concrete manufacturer or supplier is located.
14. **INTERIOR LIGHTING FIXTURES:** For each lighting fixture type installed within the building's weather barrier, provide manufacturer's cut sheets indicating the following:
 - a. Fixture power in watts.
 - b. Initial lamp lumens.
 - c. Photometric distribution data.
 - d. Dimming capability, in range of percentages.
15. **EXTERIOR LIGHTING FIXTURES:** For each lighting fixture type installed on site, provide manufacturer's cut sheets indicating the following:
 - a. Fixture power in watts.
 - b. Initial lamp lumens.
 - c. Photometric distribution data.
 - d. Range of field adjustability, if any.
 - e. Warranty of suitability for exterior use.
16. **ALTERNATIVE TRANSPORTATION:** Provide manufacturer's cut sheets and/or shop drawings for the following items installed on site:
 - a. Bike racks, including total number of bicycle slots provided.
 - b. Signage indicating parking spaces reserved for electric or low-emitting vehicles and for carpools/vanpools, including total number of signs.
17. **WATER CONSERVING FIXTURES:** For all water consuming plumbing fixtures and fittings, provide manufacturer's cut sheets showing maximum flow rates and/or flush rates.
18. **ENERGY SAVING APPLIANCES:** Provide manufacturer's cut sheets and published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the product's rating under the U.S. EPA/DOE Energy Star program, for all of the following:
 - a. Appliances (i.e., refrigerators, dishwashers, microwave ovens, televisions, clothes washers, clothes dryers, chilled water dispensers).
 - b. Office equipment (i.e., copy machines, fax machines, plotters/printers, scanners, binding and publishing equipment).
 - c. Electronics (i.e., servers, desktop computers, computer monitor displays, laptop computers, network equipment).
 - d. Commercial food service equipment
19. **GLAZING:** For glazing in any windows, doors, storefront and window wall systems, curtainwall systems, skylights, and partitions, provide manufacturer's cut sheets indicating the following:
 - a. Glazed area.
 - b. Visible light transmittance.
 - c. Solar heat gain coefficient.
 - d. Fenestration assembly u-factor.



20. VENTILATION: Provide manufacturer's cut sheets for the following:
- Carbon dioxide monitoring systems, if any, installed to measure outside air delivery.
 - Air filters: for detailed requirements refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS.
21. REFRIGERATION: For all refrigeration equipment, provide manufacturer's cut sheets indicating the following:
- Equipment type.
 - Equipment life. Default values specified by the 2007 ASHRAE Applications Handbook will be used unless otherwise demonstrated by the manufacturer's guarantee and an equivalent long-term service contract.
 - Refrigerant type.
 - Refrigerant charge in pounds of refrigerant per ton of gross cooling capacity.
 - Tested refrigerant leakage rate, in percent per year. A default rate of 2% will be used unless otherwise demonstrated by test data.
 - Tested end-of-life refrigerant loss, in percent. A default rate of 10% will be used unless otherwise demonstrated by test data.

1.7 LEED BUILDING SUBMITTAL REQUIREMENTS:

- A. The LEED BUILDING Submittal information shall be assembled into one package per contract specification section(s) (or per subcontractor), and submitted in accordance with Section 01 33 00, SUBMITTAL PROCEDURES. Incomplete or inaccurate LEED BUILDING submittals may be used as the basis for the rejection of products or assemblies. Incomplete or inaccurate LEED BUILDING Submittals may be used as the basis for rejecting the submitted products or assemblies.

1.8 LEED ACTION PLANS:

- A. Construction Waste Management Plan- Refer to Section 01 74 19, Construction Waste Management and Disposal for detailed submittal requirements.
- B. Construction IAQ Management Plan- Refer to Section 01 81 19, Indoor Air Quality Requirements for LEED Buildings, for detailed submittal requirements.
- C. Erosion and Sedimentation Control Plan:
- The Plan shall be in accordance with the New York State Department of Environmental Conservation (NYSDEC) or the 2003 EPA Construction General Permit, whichever is more stringent.
 - The Plan shall be submitted in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
 - Detailed requirements: ESC Plan
 - Include the Stormwater Pollution Prevention Plan, if required.
 - Identify the party responsible for Plan monitoring and documentation. The party must be regularly on site.
 - Describe all site work that will be implemented on the project.
 - Provide site plan with location of ESC measures, including, but not limited to, stormwater quantity controls, stormwater quality controls, stabilized construction entrances, washdown areas, and inlet/catch basin protection.
 - Describe the inspection and maintenance of the ESC measures. Provide a construction schedule indicating weekly site review.
 - Describe reporting and documentation measures.
 - Detailed requirements: ESC Measures



5. Submittal requirements: ESC Tracking Log
 - a. Note date of major rain events, describe damage, describe any repairs or maintenance performed, and note responsible party.
 - b. Note date and findings of weekly site review, describe any repairs or maintenance performed, and note responsible party.
 - c. Submit monthly.
6. Implementation
 - a. The Contractor shall implement the ESC Plan, coordinate the Plan with all affected trades, and designate one individual as the Erosion and Sedimentation Control Representative, who will be responsible for communicating the progress of the Plan with the Commissioner on a regular basis, and for assembling the required LEED documentation.
 - b. The Contractor shall be responsible for the provision, maintenance, and repair of all ESC measures.
 - c. Demonstration. The Contractor shall provide on-site instruction of proper construction practices required to prevent erosion and sedimentation.
 - d. Meetings. Urgent or ongoing ESC issues shall be discussed at weekly on-site job meetings.

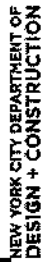
1.9 QUALITY ASSURANCE:

- A. The Contractor shall implement all LEED Action Plans, coordinate the Plans and LEED Building Submittals with all affected trades, and designate one individual as the Sustainable Construction Representative at no additional cost to the City of New York, who will be responsible for communicating the progress of LEED activities with the Commissioner on a regular basis, and for assembling the required LEED documentation.
- B. Responsibilities of Contractor's Subcontractors: The Contractor shall be responsible for his/her subcontractors complying with the LEED Action Plans and for providing required LEED documentation as required for the project.
- C. Distribution and Compilation: The Contractor shall be responsible for distributing the EBMCF and any other forms or templates required for the subcontractors to record LEED documentation. The Contractor shall also be responsible for collecting and compiling EBMCF information into packages as described in Section 01 33 00 SUBMITTAL PROCEDURES.
- D. Meetings: Sustainable design and construction issues shall be discussed at the following meetings:
 1. Demolition kick-off meeting
 2. Construction kick-off meeting
 3. Construction kick-off meeting for LEED (independent meeting)
 4. Weekly job-site progress and coordination meetings
 5. Closeout meeting

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13



ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM

Contractor Name: _____
Contractor Contact: _____
Telephone Number: _____

[illegible]

¹ **Material Cost:** As it appears on the manufacturer's or distributor's invoice to the contractor or subcontractor. Does not include labor or equipment costs associated with installation.

² **Pre-Consumer Recycled Content:** Industrial/manufacturing waste material (e.g., fly-ash and synthetic gypsum, both waste products from coal burning electricity plants) diverted from landfill and incorporated into a finished product. Scrap raw materials that can be reused in the same manufacturing process from which they are recovered are not considered Pre-Consumer Recycled Content.

3 Post-Consumer Recycled Content: Material or product that has served its intended consumer use (e.g., an empty plastic bottle) and has been diverted from landfill and incorporated into a finished product.

⁴Regional: Refers to a material/product that is BOTH extracted AND manufactured within 500 miles of the Project site. Record this information ONLY for materials/products meeting BOTH of these criteria.

⁵ Extraction: Refers to the location from which the raw resources used in a building product are extracted, harvested, or recovered.

6 Manufacture: Refers to the location of the final assembly of components into a building product that is furnished and installed by the Contractor.

7 **Rapidly Renewable:** Refers to materials/products derived from agricultural products that are typically harvested within a ten-year or shorter cycle.

VOC Content: The quantity of volatile organic compounds contained in adhesives, sealants, paints and architectural coatings. Reported in grams/liter or lbs/gallon. Less water.

^a **Flooring:** For carpet, indicate Carpet and Rug Institute (CRI) Green Label Plus certification. For carpet cushion, indicate CRI Green Label certification. For all flooring except unfinished/un-treated wood and mineral-based flooring (tile, masonry, terrazzo, cut stone) without organic-based coatings or sealants, indicate Resilient Floor Covering Institute FloorScore rating. VOC limits for adhesives, sealants, etc. still apply.

¹⁰Added Urea Formaldehyde: Applies to composite wood and aggrifiber products only (plywood, particleboard, MDF, OSB, wheelboard, strawboard). Resins or binders with added urea formaldehyde are prohibited.

¹¹FSC Certified: Certification from the Forest Stewardship Council. This column is only applicable to wood products.

* Applies only to materials/products installed within the weather barrier.

Contractor Certification:

I, _____ a duly authorized representative of _____ (the Contractor) hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by the Contractor 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 Commissioner.

Signature of Authorized Representative: _____ Date: _____

NO TEXT



SECTION 01 81 13.13

**VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR
LEED BUILDINGS**

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.13

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes requirements for volatile organic compound (VOC) content in adhesives, sealants, paints and coatings used for the project.
- B. All sections in the Project Specifications with adhesives, sealant or sealant primer applications, paints and coatings shall follow all requirements of this section. In the event of any conflict or inconsistency between this section and the Specifications regarding adhesives, sealant or sealant applications, paints and coatings, the requirements set forth in this Section shall prevail.
- C. This Section includes:
1. General Requirements
 2. References
 3. VOC Requirements for Interior Adhesives
 4. VOC Requirements for Interior Sealants
 5. VOC requirements for Interior Paints
 6. VOC requirements for Interior Coatings
 7. Submittals

1.3 RELATED SECTIONS: Include without limitation the following:

- | | | |
|----|------------------|--|
| A. | Section 01 10 00 | SUMMARY |
| B. | Section 01 31 00 | PROJECT MANAGEMENT AND COORDINATION |
| C. | Section 01 32 00 | CONSTRUCTION PROGRESS DOCUMENTATION |
| D. | Section 01 33 00 | SUBMITTAL PROCEDURES |
| E. | Section 01 73 00 | EXECUTION |
| F. | Section 01 77 00 | CLOSEOUT PROCEDURES |
| G. | Section 01 78 39 | CONTRACT RECORD DOCUMENTS |
| H. | Section 01 81 13 | SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS |
| I. | Section 01 81 19 | INDOOR AIR QUALITY FOR LEED BUILDINGS |

1.4 DEFINITIONS:

- A. **ADHESIVE:** Any substance used to bond one surface to another by attachment. Includes adhesive primers and adhesive bonding primers.
1. **Aerosol Adhesive:** Any adhesive packaged as an aerosol with a spray mechanism permanently housed in a non-refillable can designed for hand-held application without the need for ancillary equipment.
- B. **CARCINOGEN:** A chemical listed as a known, probable, reasonably anticipated, or possible human

VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES,
SEALANTS, PAINTS & COATINGS FOR LEED BUILDINGS



carcinogen by the International Agency for Research on Cancer (IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, and C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the Occupational Safety and Health Administration (OSHA).

- C. **CLEAR WOOD FINISH:** Clear/semi-transparent coating applied to wood substrates to provide a transparent or translucent solid film.
 - 1. **Lacquer:** Clear/semi-transparent coating formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and provide a solid, protective film.
 - 2. **Sanding Sealer:** A sanding sealer that also meets the definition of a lacquer.
 - 3. **Varnish:** Clear/semi-transparent coating, excluding lacquers and shellacs, formulated to dry by chemical reaction on exposure to air. May contain small amounts of pigment.
- D. **COATING:** Liquid, liquefiable, or mastic composition that is converted to a solid adherent film after application to a substrate as a thin layer; and is used for decorating, protecting, identifying or to serve some functional purpose such as the filling or concealing of surface irregularities or the modification of light and heat radiation characteristics; and is intended for on-site application to interior or exterior surfaces of buildings. Does not include stains, clear finishes, recycled latex paint, specialty (industrial, marine or automotive) coatings or paint sold in aerosol cans.
- E. **FLOOR COATING:** Opaque coating applied to flooring. Excludes industrial maintenance coatings.
- F. **HAZARDOUS AIR POLLUTANT:** Any compound listed by the U.S. EPA in the Clean Air Act Section 112(b)(1) as a hazardous air pollutant.
- G. **MUTAGEN:** A chemical that meets the criteria for category 1, chemicals known to induce heritable mutations or to be regarded as if they induce heritable mutations in the germ cells of humans, under the Harmonized System for the Classification of Chemicals Which Cause Mutations in Germ Cells (United Nations Economic Commission for Europe, Globally Harmonized System of Classification and Labeling of Chemicals).
- H. **OZONE-DEPLETING COMPOUNDS:** A compound with an ozone-depletion potential greater than 0.1 (CFC 11=1) according to the U.S. EPA list of Class I and Class II Ozone-Depleting Substances.
- I. **PAINT:** A pigmented coating. For the purposes of this specification, paint primers are considered to be paints.
 - 1. **Flat Coating or Paint:** Has a gloss of less than 15 (using an 85-degree meter) or less than 5 (using a 60-degree meter).
 - 2. **Non-Flat Coating or Paint:** Has a gloss of greater than or equal to 15 (using an 85-degree meter) or greater than or equal to 5 (using a 60-degree meter).
 - 3. **Non-Flat High-Gloss Coating or Paint:** Has a gloss of greater than or equal to 70 (using a 60-degree meter).
 - 4. **Anti-Corrosive / Rust Preventative Paint:** Coating formulated and recommended for use in preventing the corrosion of ferrous metal substrates.
- J. **PRIMER:** Coating that is formulated and recommended for one or more of the following purposes: to provide a firm bond between the substrate and a subsequent coating; to prevent a subsequent coating from being absorbed into the substrate; to prevent harm to a subsequent coating from materials in the substrate; or to provide a smooth surface for application of a subsequent coating.
- K. **REPRODUCTIVE TOXIN:** A chemical listed as a reproductive toxin (including developmental, female, and male toxins) by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. Seq.).
- L. **SANDING SEALER:** Clear/semi-transparent coating formulated to seal bare wood. Can be abraded to create a smooth surface for subsequent coatings. Does not include sanding sealers that are lacquers (see Clear Wood Finish above).
- M. **SEALANT:** Any material with adhesive properties, formulated primarily to fill, seal, or waterproof gaps or joints



between surfaces. Includes sealant primers and caulks.

- N. SHELLAC: Clear or pigmented coating formulated solely with the resinous secretions of the lac beetle, thinned with alcohol and formulated to dry by evaporation without chemical reaction. Excludes floor applications.
- O. STAIN: Clear semi-transparent/opaque coating formulated to change the color but not conceal the grain pattern or texture of the substrate.
- P. VOLATILE AROMATIC COMPOUND: Any hydrocarbon compound containing one or more 6-carbon benzene rings, and having an initial boiling point less than or equal to 280 degrees Celsius measured at standard conditions of temperature and pressure.
- Q. VOLATILE ORGANIC COMPOUND: Any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) which vaporizes (becomes a gas) and participates in atmospheric photochemical reactions, as specified in Part 51.00 of Chapter 40 of the U.S. Code of Federal Regulations, at normal room temperatures. For the purposes of this specification, formaldehyde and acetaldehyde are considered to be VOCs.
- R. WATERPROOFING SEALER: A coating that prevents the penetration of water into porous substrates.

1.5 GENERAL REQUIREMENTS:

- A. The City of New York is committed to implementing good environmental practices and procedures which include achieving a LEED Green building rating. Specific project requirements related to this goal which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements as defined in the sections below and in related sections of the Contract Documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated environmental goals.

1.6 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

1.6 VOC REQUIREMENTS FOR INTERIOR ADHESIVES, SEALANTS, PAINTS AND COATINGS:

- A. GENERAL: Unless otherwise specified herein, the VOC content of all interior adhesives, sealants, paints and coatings (herein referred to as "products") shall not be in excess of **250 grams per liter**.
- B. No product shall contain any ingredients that are carcinogens, mutagens, reproductive toxins, persistent bioaccumulative compounds, hazardous air pollutants, or ozone-depleting compounds. An exception shall be made for titanium dioxide and, for products that are pre-tinted by the manufacturer, carbon black, which shall be less than or equal to 1% by weight of the product.
- C. No product shall contain the following:
 - 1. methylene chloride
 - 2. 1,1,1-trichloroethane
 - 3. benzene



4. toluene
5. ethylbenzene
6. vinyl chloride
7. naphthalene
8. 1,2-dichlorobenzene
9. di (2-ethylhexyl) phthalate
10. butyl benzyl phthalate
11. di-n-butyl phthalate
12. di-n-octyl phthalate
13. diethyl phthalate
14. dimethyl phthalate
15. isophorone
16. antimony
17. cadmium
18. hexavalent chromium
19. lead
20. mercury
21. formaldehyde
22. methyl ethyl ketone
23. methyl isobutyl ketone
24. acrolein
25. acrylonitrile

D. No product shall contain more than 1.0% by weight of sum total of volatile aromatic compounds.

1.8 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.
- C. For specified building construction related applications, the allowable VOC content is as follows:

1. Architectural Applications:

a. Indoor carpet adhesive	50
b. Carpet pad adhesive	50
c. Wood flooring adhesive	100
d. Rubber floor adhesive	60
e. Subfloor adhesive	50
f. Ceramic tile adhesive	65
g. VCT and asphalt tile adhesive	50
h. Drywall and panel adhesive	50
i. Cove base adhesive	50
j. Multipurpose construction adhesive	70
k. Structural glazing adhesive	100
2. Specialty Applications:

a. PVC welding	510
b. CPVC welding	490
c. ABS welding	325
d. Plastic cement welding	250

VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES,
SEALANTS, PAINTS & COATINGS FOR LEED BUILDINGS



- | | | |
|-------------------------------------|---|---------------------|
| e. | Adhesive primer for plastic | 550 |
| f. | Contact Adhesive | 80 |
| g. | Special Purpose Contact Adhesive | 250 |
| h. | Structural Wood Member Adhesive | 140 |
| i. | Sheet Applied Rubber Lining Operations | 850 |
| j. | Top and Trim Adhesive | 250 |
| 3. Substrate Specific Applications: | | |
| a. | Metal to metal | 30 |
| b. | Plastic foams | 50 |
| c. | Porous material (except wood) | 50 |
| d. | Wood | 30 |
| e. | Fiberglass | 80 |
| 4. Aerosol Adhesives: | | |
| a. | General purpose mist spray | 65% VOC's by weight |
| b. | General purpose web spray | 55% VOC's by weight |
| c. | Special purpose aerosol adhesives (all types) | 70% VOC's by weight |

1.9 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:

a.	Architectural	250
b.	Non-membrane roof	300
c.	Roadway	250
d.	Single-ply roof membrane	450
e.	Other	420
 2. Sealant Primer:

a.	Architectural – Nonporous	250
b.	Architectural – Porous	775
c.	Other	750

1.10 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:
5. 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:

- 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.

1.11 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:	
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.

1.12 SUBMITTALS:

- A. Submit Material Safety Data Sheets, for all applicable products in accordance with Section 01 33 00, SUBMITTAL PROCEDURES. 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).
- B. Submit Environmental Building Materials Certification Form (EBMCF) as referenced in Section 01 81 13 SUSTAINABLE REQUIREMENTS FOR LEED BUILDINGS: For each field-applied adhesive, sealant, paint, and coating product, provide the VOC requirement, as provided in this Specification, for the relevant material category indicated on the documentation noted above.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13.13



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
Revised - January 15, 2015

SECTION 01 81 19
INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 19

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 CONSTRUCTION IAQ MANAGEMENT GOALS FOR THE PROJECT:

- A. The City of New York has determined that this Project 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.

1.3 RELATED SECTIONS:

- A. All sections of the Specifications related to interior construction, MEP systems, and items affecting indoor air quality.
- B. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS
- C. Section 01 81 13.13, VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS.
- D. Division 9 (of the Specifications): Finishes.

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- C. 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.

INDOOR AIR QUALITY
REQUIREMENTS FOR LEED BUILDINGS
01 81 19- 1



- D. Materials that act as "sinks" for VOC contamination: Absorptive materials, typically dry and soft materials (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that readily absorb VOC's emitted by "source" materials and release them over a prolonged period of time.
- E. 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 as flooring coverings with plasticizers and engineered wood with formaldehyde).

1.5 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

1.6 LEED BUILDING GENERAL REQUIREMENTS:

- A. Implement practices and procedures as necessary to meet the project's environmental performance goals as set forth in the specific requirements of this section. Specific project goals that may impact this area of work include: use of recycled-content materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.7 CONSTRUCTION IAQ MANAGEMENT PLAN :

- A. The Contractor shall prepare a Construction IAQ Management Plan in coordination with each subcontractor and submit the IAQ Management Plan to the Commissioner for approval in accordance with Section 01 33 00, SUBMITTAL PROCEDURE. 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 media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.
 - 4. Filtration media shall be replaced immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999 if the project is pursuing Indoor Air Quality Credit 5: Indoor Chemical Pollutant Source Control.
 - 5. A "Sequence of Finish Installation Plan" shall be developed, highlighting measures to reduce the absorption of VOCs by materials that act as "sinks".
 - 6. Upon approval of the Plan by the Commissioner, it shall be implemented by the Contractor through the duration of the construction process, and documented in accordance with the Submittal Requirements of Sub-Section 1.8 herein.



B. 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
 - 1) Protect air handling and distribution equipment and air supply and return ducting during construction.
 - 2) All ductwork arriving on site will be sealed with plastic sheeting and stored on pallets or dunnage until installed.
 - 3) Cover and protect all exposed air inlets and outlets, openings, grilles, ducts, plenums, etc. to prevent water, moisture, dust and other contaminant intrusion.
 - 4) Apply protection immediately after ducting.
 - 5) Protect ducting runs at the end of day's work.
 - 6) Inspect temporary filtration weekly and replace as required to maintain the proper ventilation rates in the building.
 - b. Source Control
 - 1) Protect stored on-site or installed absorptive or porous materials.
 - 2) Do not use wet or damaged porous materials in the building.
 - 3) Recover, isolate, and ventilate containers housing toxic materials and materials with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications.
 - 4) Exhaust fumes from idling vehicles and gasoline fueled tools through use of funnels or temporary piping.
 - 5) Containers housing toxic materials and materials with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications, shall be closed when not in use.
 - c. Pathway Interruption
 - 1) Depressurize work areas to contain dust and odors.
 - 2) Pressurize occupied spaces to prevent intrusion of dust and odors.
 - 3) Erect barriers to contain construction areas.
 - 4) Relocate pollutant sources.
 - 5) Temporarily seal the building and provide 100% outside air for ventilation.
 - d. Housekeeping
 - 1) Store materials on elevated platforms under cover, in a designated dry, clean location, prior to unpacking for installation.
 - 2) If materials are not stored in an enclosed location, cover tops and sides of material with waterproof sheeting, securely tied.
 - 3) Institute cleaning activities to remove contaminants from the building prior to occupancy. Clean all coils, air filters, and ductwork prior to performing testing, adjusting, and balancing of HVAC systems.
 - 4) Sweep the work area on a daily basis. Use an efficient and effective dust collecting method such as damp cloth, wet mop, or vacuum with particulate filters. Activities which produce high levels of dust shall be cleaned up immediately upon completion.
 - 5) Spills or excess applications of products containing solvents, or with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications, must be removed immediately.
 - 6) Dust all walls prior to application of finishes.
 - 7) Vacuum all stud tracks prior to application of insulation.
 - 8) Materials which become contaminated through direct exposure to moisture from



- precipitation, plumbing leaks, or condensation shall be replaced by the Contractor.
- e. Scheduling
- 1) Phase construction such that absorptive materials are installed only in areas that are weathertight.
 - 2) Schedule activities that utilize "sources" of VOC contamination to take place prior to installing high absorbent materials that will act as "sinks" for contaminants.
 - 3) Review of the appropriate components of the Construction IAQ Management Plan shall be a regular action topic at weekly site coordination meetings. Implementation of the Plan shall be documented in the meeting minutes.
2. Protection 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. Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase as follows:

OPTION 1 — Flush-Out

• After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

OR

• If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

OR



OPTION 2 — Air Testing

- Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED-NC Reference Guide.
- Demonstrate that the contaminant maximum concentrations listed below are not exceeded.

CONTAMINANT	MAXIMUM CONCENTRATION
Formaldehyde	27 parts per billion
Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
* 4-Phenylcyclohexene (4-PCH)	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor levels
* This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.	

- For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.
- The air sample testing shall be conducted as follows:
 - a. All measurements shall be conducted prior to occupancy, but during normal occupied hours and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 - b. The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - c. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq.ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
 - d. Air samples shall be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.
- 6. 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 at no additional cost to the City of New York, who will be responsible for communicating the progress of the Plan with the Commissioner 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.



- a. Distribution: The Contractor shall distribute copies of the Construction IAQ Management Plan in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- b. Instruction: The Contractor shall provide on-site instruction of appropriate site management to all Contractor's Subcontractors.
- c. Monitoring: The Construction IAQ Representative shall monitor the implementation of the Construction IAQ Management Plan.

1.8 SUBMITTALS:

Submit the following LEED-required records and documents in accordance with Section 01 33 00, SUBMITTAL PROCEDURES and Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS.

- A. A copy of the Construction IAQ Management Plan as defined in Sub-Section 1.07 herein.
- 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 Contractor's or Subcontractor's 'approved' stamp as confirmation that the products are the products installed on the project.
- C. Provide the Commissioner with a minimum of 18 photographs as required under the provision for Special Photographs, in accordance with Section 01 32 33, PHOTOGRAPHIC DOCUMENTATION, comprised of at least six photographs taken on three different occasions during construction. 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.
- D. A copy of the project's TAQ Testing report if applicable.

1.9 QUALITY ASSURANCE:

- A. The Contractor shall be responsible for preparing and implementing the Construction IAQ Management Plan and shall coordinate and incorporate the work of its subcontractors in the IAQ Management Plan.
- B. Responsibility of Subcontractors: Subcontractors for this project shall be responsible to cooperate with the Contractor in the preparation and implementation of the Construction IAQ Management Plan.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 19



SECTION 01 91 13
GENERAL COMMISSIONING REQUIREMENTS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 91 13

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].
- B. OPR and BoD documentation are included by reference for information only.
- C. The Commissioning Plan, prepared by the Commissioning Agent (CxA) under separate contract with the City of New York, contains requirements that apply to this section.

1.2 SUMMARY:

- A. This Section includes general requirements that apply to implementation of Commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. This Section includes:
 - 1. Definitions
 - 2. Commissioning Team
 - 3. City's Responsibilities
 - 4. Each Contractor's Responsibilities
 - 5. Commissioning Authority's/Agent's (CxA) Responsibilities
 - 6. Commissioning Documentation
 - 7. Submittals
 - 8. Coordination

1.3 RELATED SECTIONS: Include without limitation the following:

- A. "HVAC Commissioning Requirements" indicated in other sections of the project specifications for specific requirements for commissioning HVAC systems.
- B. This project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning shall be in accordance with ASHRAE and USGBC LEED procedures, and specific commissioning requirements of the Project Specifications, whichever is more stringent. The Contractor shall cooperate with the CxA and provide whatever assistance is required.
- C. Related Sections include without limitation the following:
 - 1. Section 01 10 00 SUMMARY
 - 2. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
 - 3. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
 - 4. Section 01 78 39 CONTRACT RECORD DOCUMENTS
 - 5. Section 01 79 00 DEMONSTRATION AND TRAINING
 - 6. Section 01 81 13 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.



- B. Design Consultant: "Design Consultant" shall mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
- C. Commissioner: The Commissioner of the Department of Design and Construction of the City of New York, his/her successors, or duly authorized representative(s).
- D. BoD: Basis of Design: A document, prepared by the Consultant Architect/Engineer, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- E. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- F. CxA: Commissioning Agent (Aka Commissioning Authority) under separate contract with the City of New York to provide Commissioning Services for this project.
- G. OPR: Owner's (City of New York) Project Requirements: A document, prepared by the Consulting Architect/Engineer) that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- H. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.
- I. TAB: Testing, Adjusting, and Balancing.

1.5 COMMISSIONING TEAM:

- A. Members Appointed by the Contractor and its Subcontractors: Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of the Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by the City:
 - 1. Commissioning Authority/Agent (CxA): The designated person, company, or entity under separate contract with the City that plans, schedules, and coordinates the commissioning team to implement the commissioning process.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Consultant Architect/Engineer and other concerned entities.

1.6 CITY'S RESPONSIBILITIES:

- A. Provide the OPR documentation to the Commissioning Agent (CxA) for use in developing the commissioning plan; systems manual; operation and maintenance training plan; and testing plans and checklists.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.



- C. Provide the BoD documents, prepared by the Consulting Architect/Engineer and approved by the Commissioner, to the Commissioning Agent (CxA) for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.7 CONTRACTOR'S RESPONSIBILITIES:

- A. The Contractor shall provide utility services required for the commissioning process.
- B. As a member of the Commissioning Team, the Contractor and subcontractor(s) shall assign representatives with expertise and authority to act on behalf of the Contractor and its subcontractor(s) and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
 - 1. Participate in scheduled construction-phase coordination and commissioning team meetings.
 - 2. Integrate and coordinate commissioning process activities with the construction schedule.
 - 3. Review and accept commissioning process test procedures provided by the CxA.
 - 4. Review and accept construction checklists provided by the CxA.
 - 5. Perform testing required in the Commissioning Schedule as per the Commissioning Process test procedures provided by the CxA.
 - 6. Complete installation checklists as Work is completed and return to CxA through the Resident Engineer.
 - 7. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 - 8. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 9. Submit As-Built documents, operation and maintenance manuals for systems and subsystems, and equipment in accordance with Section 01 78 39, CONTRACT RECORD DOCUMENTS.
 - 10. Provide orientation sessions for operation and maintenance personnel (sessions will be video recorded by the CxA) in accordance with Section 01 79 00, DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

1.8 COMMISSIONING AGENT'S (CxA) RESPONSIBILITIES:

- A. Organize and lead the commissioning team.
- B. Prepare a construction-phase commissioning plan. Collaborate through the Resident Engineer with each Contractor and with subcontractors to develop test and inspection procedures. Include design changes and coordinate commissioning activities with the overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.
- C. Review and comment in accordance with Section 01 33 00, SUBMITTAL PROCEDURES, on submittals from the Contractor for compliance with the OPR, BoD, Contract Documents, and construction-phase commissioning plan. Review and comment on performance expectations of systems and equipment and interface between systems relating to the OPR and BoD.
- D. Coordinate with the Resident Engineer to convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent CxA will prepare and distribute minutes to commissioning team members and attendees within three workdays of the commissioning meeting.
- E. At the beginning of the construction phase, coordinate with the Resident Engineer's kick-off meeting schedule to conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals, operation and maintenance training sessions, TAB Work, and Project completion.



- F. Observe and inspect construction. Report progress and deficiencies to the Commissioner. In addition to compliance with the OPR, BoD, and Contract Documents, inspect systems and equipment installation for adequate accessibility required for component maintenance replacement and repair.
- G. Prepare Project-specific test and inspection procedures and checklists.
- H. Coordinate with the Resident Engineer to schedule, direct, witness, and document tests, inspections, and systems startup.
- I. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- J. Certify date of acceptance and startup for each item of equipment for start of warranty periods.
- K. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BoD, and Contract Documents. Operation and maintenance documentation requirements are specified in other sections of the project specifications and described in Section 01 78 39, CONTRACT RECORD DOCUMENTS.
- L. Record and edit demonstration and orientation sessions on DVD.
- M. Prepare commissioning reports.
- N. Assemble the final commissioning documentation, including the commissioning report and Systems Manual.

1.9 COMMISSIONING DOCUMENTATION:

The Contractor shall assist the Commissioning Agent (CxA) in the development and compiling of the following Commissioning Documentation:

- A. Index of Commissioning Documents: The Commissioning Agent (CxA) will prepare an index including the storage location of each document.
- B. OPR: A written document prepared by the Commissioning Agent (CxA) that details the functional requirements of the Project and expectations of how it will be used and operated. This document includes the Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
- C. BoD Document: A document prepared by the Consulting Architect/Engineer that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that explain the designed systems.
- D. Commissioning Plan: A document prepared by the Commissioning Agent (CxA) that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process.
- E. Test Checklists: The Commissioning Agent (CxA) will develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. The CxA will prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Space will be provided for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in other sections of the project specifications.
- F. Inspection Checklists will be signed by the Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing.
- G. Test and Inspection Reports: The Commissioning Agent (CxA) will record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application will be included with data. CxA shall compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.



- H. Corrective Action Documents: The Commissioning Agent (CxA) will document corrective action taken for systems and equipment that fail tests and include required modifications to systems and equipment and revisions to test procedures, if any. The Contractor shall retest systems and equipment requiring corrective action. The CxA will document retest results.
- I. Issues Log: The Commissioning Agent (CxA) will prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents. The log will identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.
 - 1. Commissioning Report: The Commissioning Agent (CxA) will document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report will indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BoD, and Contract Documents.
- J. Systems Manual: The Commissioning Agent (CxA) will gather required information and compile systems manual as specified in other sections of the project specifications and described in Section 01 78 39, CONTRACT RECORD DOCUMENTS..

1.10 SUBMITTALS:

- A. Commissioning Plan Pre-final Submittal: The Commissioning Agent (CxA) will submit six (6) copies of the pre-final commissioning plan to the Commissioner for review and distribution.
- B. Commissioning Plan Final Submittal: The Commissioning Agent (CxA) will submit six (6) hard copies and electronically formatted information of the final commissioning plan to the Commissioner. The final submittal will address previous review comments.
- C. Test and Inspection Reports: CxA will submit test and inspection reports.
- D. Corrective Action Documents: CxA will submit corrective action documents.

1.11 COORDINATION:

- A. Coordinating Meetings: The Commissioning Agent (CxA) will coordinate with the Resident Engineer's regularly scheduled construction progress meetings to conduct coordination meetings of the commissioning team to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- B. Pre-testing Meetings: The Commissioning Agent (CxA) will coordinate with the Resident Engineer to conduct pretest meetings of the commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.
- C. Testing Coordination: The Commissioning Agent (CxA) will coordinate with the Resident Engineer the sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Coordinate schedule times with the Resident Engineer for tests, inspections, obtaining samples, and similar activities.
- D. Manufacturers' Field Services: The Commissioning Agent (CxA) will coordinate services of manufacturers' field services.

PART II – PRODUCTS (Not Used)



PART III – EXECUTION

3.1 OPERATION & MAINTENANCE MANUALS

A. General

1. The CxA shall review the Operation & Maintenance manuals provided by the Contractor or subcontractors for completeness of the document. The review process shall verify that Operation & Maintenance instructions meet specifications and are included for all commissioned equipment furnished by the Contractor.
2. Published literature shall be specifically oriented to the provided equipment, indicating required operation and maintenance procedures, parts lists, assembly / disassembly diagrams and related information.
3. The Contractor shall incorporate the standard technical literature into system specific formats for this facility as designed and as actually installed. The resulting Operation & Maintenance information shall be system specific, concise, to the point and tailored specifically to this facility. The CxA shall review these documents as necessary for final corrections by the Contractor.

- B. The Operation & Maintenance Manual review and coordination efforts shall be completed prior to Owner orientation sessions, as these documents are to be utilized in the training sessions.

C. System Operations Manual

1. The CxA shall prepare and deliver these documents with inputs from other agencies. The contractors will confirm the proper documents are onsite and readily available. Typically, the manual includes the following:
 - a. Commissioned systems single line diagrams (Mechanical, Electrical, Plumbing, and Building Management System (BMS) subcontractors).
 - b. As built sequences of operations, control drawings and original set points (Design Consultant and BMS subcontractor)
 - c. Operating instructions for integrated building systems (mechanical and BMS subcontractors).
 - d. Recommended schedule of maintenance requirements and frequency (subcontractors).
 - e. Recommended schedule for calibrating sensors and actuators (BMS subcontractor)

3.2 DEMONSTRATION AND INSTRUCTION

- A. The Contractor shall schedule and coordinate instruction sessions for the facility's staff for each commissioned system. Demonstrations shall be held per Contract Documents, along with the appropriate schematics, handouts and visual / audio training aids onsite with equipment.
- B. The equipment vendors shall provide instruction on the specifics of each major equipment item including philosophy, troubleshooting and repair techniques.
- C. For additional prescription pertinent to instruction, refer to other specific divisions for demonstration and instruction requirements.

3.3 WARRANTY REVIEW / SEASONAL TESTING

- A. The CxA will return upon the start of the new season (cooling or heating) after project completion to conduct performance tests that could not be performed due to ambient conditions. The seasonal testing will only be performed if unsuitable loads / conditions were unavailable during the performance testing stages (in other words; the requirement for testing is warranted).
- B. If agreed upon by facility, Seasonal Testing can also be used for the Warranty Review. During which the CxA will interview the occupants, maintenance staff, review the operation of the building, provide recommendations for installation and operational problems and document warranty and operational issues in the issues database.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
Revised - January 15, 2015

3.4 RECORD DRAWINGS

- A. The CxA shall review the as built contract documents to verify incorporation of both design changes and as built construction details. Discrepancies noted shall be corrected by the appropriate party.

END OF SECTION 01 91 13



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
SINGLE CONTRACT PROJECTS
Issue Date - June 01, 2013
Revised - January 15, 2015

NO TEXT

GENERAL COMMISSIONING REQUIREMENTS
01 91 13 - 8

FMS ID: F175RES2



Department of
Design and
Construction

**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

**New Construction of FDNY Firehouse
for Rescue 2**

LOCATION: 1815 Sterling Place
BOROUGH: Brooklyn, 11233
CITY OF NEW YORK

ZHL Group Inc.

Contractor

Dated June 7, 20 16

Approved as to Form
Certified as to Legal Authority

[Signature]

Acting Corporation Counsel

Dated November 25 20 15

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated [Signature] 20 [Signature]

11-25-15
JP





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

30-30 THOMSON AVENUE
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**Department of
Design and
Construction**

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____





Department of
Design and
Construction

PROJECT ID:

F175RES2

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VOLUME 3 OF 3

**ADDENDUM TO THE GENERAL
CONDITIONS**

SPECIFICATIONS

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

**New Construction of FDNY Firehouse
for Rescue 2**

LOCATION:
BOROUGH:
CITY OF NEW YORK

1815 Sterling Place
Brooklyn, 11233

CONTRACT NO. 1

GENERAL CONSTRUCTION WORK

FDNY

Studio Gang Architects

Date:

October 16, 2015



11.6-042





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

ADDENDUM TO THE GENERAL CONDITIONS
FOR SINGLE CONTRACT PROJECTS

The General Conditions are hereby amended in accordance
with the terms and conditions set forth in this Addendum.

I. PROJECT DESCRIPTION

FMS #: F175RES2
PROJECT NAME: NEW CONSTRUCTION OF FDNY FIREHOUSE FOR RESCUE 2
PROJECT DESCRIPTION: Located in the Brownsville neighborhood of Brooklyn, the new firehouse is intended to become a tool for instruction, enabling the Company to stage and simulate a wide range of emergency conditions in, on, and around the building. The building's primary structure and enclosure consist of precast concrete panels and poured concrete floors. To enhance the Company's training, the new firehouse is organized around a large interior void, a space that extends from the ground to roof level. The void enables the team to practice rescue scenarios that mimic conditions common to the city, using its height and associated elements of balconies, bridge, doorways, ladders, and stairs. On the exterior, red glazed terracotta panels surround a smaller-scale series of voids—windows and doors—with highly crafted details animating these points of connection between the firehouse and the community it serves. A green roof, geothermal HVAC system, and solar hot-water heating system reduce energy use, lowering the building's carbon footprint.

PROJECT LOCATION: 1815 Sterling Place
BOROUGH: Brooklyn
CITY OF NEW YORK
ZIP CODE: 11233-5007
COMMUNITY BOARD #: Brooklyn Community Board 16
LANDMARK STATUS:

DESIGNATED LANDMARK STRUCTURE OR SITE: NO
If this is a Designated Landmark Structure or Site, Section 01 3591, Historic Treatment Procedures applies to this project.

LANDMARK QUALITY STRUCTURE: NO
If this is a Landmark Quality Structure, Section 01 3591, Historic Treatment Procedures applies to this project.

II. LEED GREEN BUILDING REQUIREMENTS
Not Used

III. COMMISSIONING REQUIREMENTS

This project includes Commissioning Requirements. The General Commissioning Requirements are found in Section 01 9113 of the DDC Standard General Conditions. Other specific Commissioning Requirements can be found in the Project Specification Sections.

IV. PROJECT MANAGEMENT

- ☐ DDC shall publicly bid and enter into all contracts for the Project. DDC shall manage the Project using its own personnel.
- ☒ DDC shall publicly bid and enter into all contracts 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 entitled "The Resident Engineer".

V. CONTRACTS FOR THE PROJECT

The Project consists of a single contract, the Contract for General Construction Work. The Contractor for General Construction Work is responsible for the performance of all required work for the Project as set forth in the Contract Documents (General Conditions, Drawings and Specifications), including all responsibilities and obligations assigned to separate Contractors for the following subdivisions of the work: Plumbing Work, HVAC Work, and Electrical Work. All responsibilities and obligations in the Contract Documents assigned to separate Contractors for such subdivisions of the work are the responsibility of the Contractor for General Construction Work.

VI. SCHEDULES

The Contractor is advised that Schedules A through 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.

VII. APPLICABILITY OF SECTIONS/SUB-SECTIONS AND AMENDED SUB-SECTIONS

The Contractor is advised that various Sections/Sub-Sections in the General Conditions may not apply to this Project or may apply as amended. Such Sections/Sub-Sections advise the Contractor to "Refer to the Addendum for the applicability of this Section/Sub-Section." Such Sections/Sub-Sections are set forth below. A check mark indicates whether the Section/Sub-Section (1) applies to the Project, (2) does not apply to the Project, or (3) applies to the Project as amended. If no box is checked, the Section/Sub-Section, as set forth in the General Conditions, applies to the Project. Amended Sections/Sub-Sections, if any, are set forth following this list of Sections.

<u>Section</u>	<u>Sub-Section</u>	<u>Sub-Section</u>	<u>Applies</u>	<u>Does not Apply</u>	<u>Applies as Amended</u>
01 1000	1.4 (B)	Scope and Intent / LEED			
	1.4(C)	Scope and Intent / Commissioning		X	
01 3233		Photographic Documentation	X	X	
01 3300	1.7 (A-D)	LEED Submittals		X	
01 3503		General Mechanical Requirements	X		
01 3506	3.2 (A-B)	Electrical Conduit System Including Boxes (Pull, Junction and Outlet)	X		
	3.3 (A-E)	Electrical Wiring Devices	X		
	3.4 (A-I)	Electrical Conductors and Terminations	X		
	3.5 (A-B)	Circuit Protective Devices	X		
	3.6 (A-J)	Distribution Centers	X		
	3.7 (A-I)	Motors	X		
	3.8 (A-I)	Motor Control Equipment	X		
		Historic Treatment Procedures		X	
01 5000	3.2 (A)	Temporary Water Facilities / Temporary Water	X		
	3.2 (B)	Temporary Water Facilities / Temporary Water – Work in Existing Facilities		X	
	3.3 (B)	Temporary Sanitary Facilities / Self-Contained Toilet Units	X		
	3.3 (C)	Temporary Sanitary Facilities / Existing Toilets		X	
	3.4 (B) 1	Temporary Power, Lighting, and Site Lighting / Connection to Utility Lines	X		

<u>Section</u>	<u>Sub-Section</u>	<u>Sub-Section</u>	<u>Applies</u>	<u>Does not Apply</u>	<u>Applies as Amended</u>
01 5000	3.4 (B) 2	Temporary Power, Lighting, and Site Lighting / Connection to Existing Electrical Power Service		X	
	3.4 (B) 3	Temporary Power, Lighting, and Site Lighting / Electrical Generator Power Service		X	
	3.4 (D)	Temporary Power, Lighting, and Site Lighting / Temporary Lighting	X		
	3.4 (E)	Temporary Power, Lighting, and Site Lighting / Site Security Lighting (for New Construction Only)	X		
	3.5 (A-J)	Temporary Heat	X		
	3.8 (A)	DDC Field Office / Office Space in Existing Building		X	
	3.8 (B)	DDC Field Office / DDC Field Office Trailer			X
	3.8 (B-3a)	DDC Field Office / DDC Managed Field Office Trailer			X
	3.8 (B-3b)	DDC Field Office / CM Managed Field Office Trailer			X
	3.8 (D)	DDC Field Office / Additional Equipment for the DDC Field Office			X
	3.13(A-D)	Work Fence Enclosure	X		
	3.17(B)	Project Rendering	X		
	3.18 (A-C)	Security Guards / Fire Guards on Site	X		
	3.1 (A-J)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Up To and Including 15 Stories	X		
		Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Over 15 Stories		X	
		Temporary Use, Operation and Maintenance of Elevators During Construction for Existing Buildings		X	
	3.3 (A-E)				
01 7300	3.3 (A-I)	Surveys	X		
	3.4 (A-B)	Borings	X		
	3.12 (A-D)	Sleeves and Hangers	X		
	3.13 (A)	Sleeve and Penetration Drawings	X		
	3.15 (A)	Location of Partitions	X		
01 7419		Construction Waste Management and Disposal			X
01 7900		Demonstration and Owner's Pre-Acceptance Orientation		X	
01 8113		Sustainable Design Requirements for LEED Buildings			X
01 8113.13		VOC Limits for Adhesives, Sealants, Paints and Coatings for LEED Buildings			X
01 8119		Indoor Air Quality Requirements for LEED Buildings			X
01 9113		General Commissioning Requirements			X

AMENDED SECTIONS/SUB-SECTIONS

The Contractor is advised that the amended Sub-Sections set forth below are included in the General Conditions and apply to the Project.

Section 015000 Temporary Facilities, Services and Controls:

Sub-Section 3.8.B.1

Applies as amended: General: Provision of the DDC Field Office shall commence within **THIRTY (30)** days from Notice to Proceed and shall continue through **SIXTY (60)** days after Substantial Completion of the required construction at the Project site. The Contractor shall remove the DDC Field Office **SIXTY (60)** days after Substantial Completion of the required construction, or as otherwise directed in writing by the Commissioner.

Sub-Section 3.8.B.3

Applies as amended: Trailer shall be an office type trailer of the size specified herein, with exterior stairs at entrance. Trailer construction shall be minimum 2 x 4 wall construction fully insulated with paneled interior walls, pre-finished gypsum board ceiling and vinyl tile floors. **The trailer shall be equipped with a working toilet, sink and electric baseboard heating.**

Sub-Section 3.8.B.3.a.3

Applies as amended: Computer Workstation: Provide **two (2)** complete computer workstations, as specified in Sub-Section 3.8.D herein, in the private office are as directed by the Resident Engineer.

Sub-Section 3.8.B.3.b.1

Applies as amended: Overall length: **60 Feet**, Overall width: **12 Feet**

Sub-Section 3.8.B.12.b

Applies as amended: **Two (2)** folding conference tables, **(1) 96" X 30"** and **(1) 72" X 30"**, and **twenty (20)** folding chairs.

Sub-Section 3.8.B.12.c

Applies as amended: **Five (5)** metal wastebaskets.

Sub-Section 3.8.B.12.d

Applies as amended: **Two (2)** fire extinguishers, **two (2)** quarts vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.

Sub-Section 3.8.B.12.e

Applies as amended: **Two (2)** Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the contract as required.

Sub-Section 3.8.B.13.a

Applies as amended: Plumbing Work: The Contractor shall provide temporary water and drainage service connections to the DDC Field Office trailer for a complete installation. Provide all necessary soil, waste, vent and drainage piping. **Provide heat trace and insulation for any piping exposed to the elements.**

Sub-Section 3.8.B.13.b.4

Applies as amended: The contractor shall pay all costs for current consumed and for maintenance of the system in operating condition, including the furnishing of the necessary bulb replacements lamps, etc., for the duration of the project and for a period of **sixty (60)** days after the date of Substantial Completion.

Sub-Section 3.8.B.13.c.2

Applies as amended: Supplies: The Contractor shall be responsible for providing (a) all office supplies, including without limitation, pens, pencils, stationery, **two (2)** filtered drinking water and sanitary supplies, **including without limitation, toilet paper, paper towels, napkins, disposable eating utensils, hot and cold drinking cups, soap and facial tissues**, and (b) all supplies in connection with required computers and printers, including without limitation, an adequate supply of blank CD's/DVD's, storage boxes for blank CDs/DVDs, **five (5) 64 gigabyte USB thumb drives**, and paper and toner cartridges for the printer.

Sub-Section 3.8.B.13.c.4

Applies as amended: At sixty (60) days after the date of Substantial Completion, or sooner as directed by the Commissioner, the Contractors shall have all services disconnected and capped to the satisfaction of the Commissioner. All repair work due to these removals shall be the responsibility of the Contractor.

Section 3.8.D

Applies as amended: Additional Equipment for the **DDC Managed Project Trailer and the CM Managed Project Trailer**

Sub-Section 3.8.D.1

Applies as amended: The Contractor shall provide an **all-in-one, high volume color copy/scanner/fax** machine (50 copies per minute) for paper sizes 8 1/2 X 11, 8 1/2 X 14 & 11 X 17. Copier shall remain at job site until the DDC Field office trailer is removed from the site.

Sub-Section 3.8.D.2

Applies as amended: The Contractor shall furnish an **all-in-one, high volume color copy/scanner/fax** machine and a telephone answering machine at commencement of the project for the exclusive use of the DDC Field Office. **The Contractor shall furnish a dormitory size refrigerator and microwave.** 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.

Sub-Section 3.8.D.3.a

Applies as amended: Hardware/Software Specification:

- 1) Computer Equipment - Computers shall be provided for all contracts regardless of construction duration.
- 2) Computers furnished by the Contractor for use by City Personnel, for the duration of the contract, shall be in accordance with Table I - ADDITIONAL SPECIFIC REQUIREMENTS, contained herein, and shall meet the following minimum requirements:
- 3) Personal Computer(s) - Workstation Configuration.
 - (a) Make and Model: Dell, HP, Gateway, or an approved equal. (Note: an approved equal requires written approval of the Assistant Commissioner of ITS.)
 - (b) Processor: i5-2400 (6mb Cache, 3.1 GHz) or faster computer-Single Processor.
 - (c) System RAM: Minimum of 8 GB (Gigabytes) Dual channel DDR3 SDRAM at 1333MHz-2 DIMMS
 - (d) Hard Disk Drive(s): 1TB Serial ATA
 - (e) 16xDVD+/-RW SATA Super Multi DVD Writer Drive or better.
 - (f) I/O Ports: Must have at least one (1) Serial Port, three (3) USB Ports.
 - (g) Video Display Card: HD Graphics with a minimum 64 MB of RAM.
 - (h) Monitor: 22" W, 23.0 Inch VIS, Widescreen, VGA/DVI LCD
 - (i) Other Peripherals: Optical scroll Mouse, 101 Key Keyboard, Mouse Pad and all necessary cables.
 - (j) Software Requirement: Microsoft Windows 7 Professional 64 bit;
Microsoft Office 2013 Professional;
Microsoft Project 2013, Adobe Acrobat reader,
Anti-Virus software package w/ 2 year updates
subscription, and Auto Cad 2016

- 4) 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 all-in-one, color/scanner/fax 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
- 5) 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.
- 6) All computers required for use in the Engineer's Field Office shall be delivered, installed, and set up in the Field Office by the Contractor.
- 7) 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.
- 8) It is the Contractor's responsibility to ensure that electrical service and phone connections are also available at all times.

Broadband connectivity is preferred at each field office location. Any questions regarding this policy should be directed to Donna Lynn, Director, ITS-User Support at 718-391-1761.

Add Sub-Section 3.8.F
SAFTEY VESTS

Add Sub-Section 3.8.F.1
Ten (10) High Visibility Construction Vests

Section 01 7419 Construction Waste Management and Disposal:

Applies as amended: This section has been fully amended by **Section 01 7419 Construction Waste Management and Disposal** of the Project Specifications.

Section 01 8113 Sustainable Design Requirements for LEED Buildings:

Applies as amended: This section has been fully amended by **Section 01 8113 Sustainable Requirements** of the Project Specifications.

Section 01 8113.13 VOC Limits for Adhesives, Sealants, Paints and Coatings for LEED Buildings:

Applies as amended: This section has been amended by **Sub-Section 2.11 Low Emitting Materials** in **Section 01 8113 Sustainable Requirements** of the Project Specifications.

Section 01 8119 Indoor Air Quality Requirements for LEED Buildings:

Applies as amended: This section has been fully amended by **Section 01 8114 Indoor Air Quality Requirements** of the Project Specifications.

Section 01 9113 General Commissioning Requirements:

Applies as amended: This section has been fully amended by **Section 01 9113 General Commissioning Requirements** of the Project Specifications.

ADDITIONAL SECTIONS/SUB-SECTIONS

The Contractor is advised that the additional Sub-Sections set forth below are included in the General Conditions and apply to the Project.

Section 01 3126 BIM Protocol: This section has been included with the Specifications.

VIII. SPECIAL EXPERIENCE REQUIREMENTS FOR THE PROJECT

- (1) **GENERAL:** Special Experience Requirements for the Project are set forth below. Such Special Experience Requirements may apply to either or both of the following entities: (a) the contractor or subcontractor that will perform specific areas of work, and/or (b) 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 Requirements that are not set forth below, such Special Experience Requirements are 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 Special 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 any specific area of work with its own forces, it must demonstrate compliance with the Special Experience Requirements. If the contractor intends to subcontract any specific area 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 that will perform the specific areas of work specified above (except Roofing Sections 074170, 075323, 075400 and 075563) 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. In addition, for roofing work, the contractor or subcontractor must be licensed or approved by the manufacturer of the roofing system. Special Experience Requirement #1 applies to the contractor or subcontractor that will perform specific areas of work specified in the sections set forth below.
 - (b) **Special Experience Requirement #2:** For Section 013126, the contractor or subcontractor that will perform the specific area of work specified above must have the following qualifications:
 - Minimum 3 years of experience in 3D Modeling construction Models for projects of the same size and complexity, coordination between subcontractors and design team, and managing of virtual design and construction process.
 - Technical knowledge of Virtual design and Construction methodologies and BIM application used, related systems and network infrastructure, and awareness of new technologies.
 - Versed in LOD 2014 and National BIM standards v3.
 - (c) **Special Experience Requirement #3:** For Roofing Sections 074170, 075323, 075400 and 075563, the contractor or subcontractor performing the work of these sections must be a company regularly engaged in performing roofing projects with its own workforce and have successfully completed in a timely fashion at least three (3) roofing projects similar in scope, size and type to the required work within the last three (3) consecutive years prior to the bid opening. At least one of those projects must have been performed within the last twelve (12) months. The three (3) qualifying projects must have utilized one or more of the roofing systems specified for the project being bid herein, been installed by the contractor's or subcontractor's company utilizing its own workforce and must have qualified for, and have been issued, the warranty provided by the manufacturer of the roofing system. In addition, the contractor or subcontractor must be a certified or authorized installer for at least one of the manufacturer's roofing systems specified herein and shall submit proof of same.

General Construction Work:

- Section 013126: BIM Protocol
- Section 031000: Concrete Formwork
- Section 032000: Concrete Reinforcement and Embedded Assemblies
- Section 033000: Cast-in-Place Concrete
- Section 034100: Precast Structural Concrete
- Section 074170: Terracotta Rainscreen Tile Cladding System
- Section 075323: Ethylene-Propylene-Diene-Monomer Roofing (EPDM)
- Section 075400: Thermoplastic Membrane Roofing
- Section 075563: Green Roof Assembly
- Section 084013: Fire-Rated Glazed Walls
- Section 084413: Glazed Aluminum Curtain Walls

- (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 #1:** 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. In addition, for Precast Structural Concrete, the manufacturer must be certified by the PreCast Institute (PCI). This Special Experience Requirement applies to the manufacturer that will provide material or equipment specified in the section(s) set forth below.

General Construction Work:

- Section 032000: Concrete Reinforcement and Embedded Assemblies
- Section 034100: Precast Structural Concrete
- Section 074170: Terracotta Rainscreen Tile Cladding System
- Section 07 5323: Ethylene Propylene Diene Monomer Roofing [EPDM]
- Section 07 5400: Thermoplastic Membrane Roofing
- Section 07 5563: Green Roof Assembly
- Section 084013: Fire-Rated Glazed Walls
- Section 084413: Glazed Aluminum Curtain Walls

IX. REVISIONS: SPECIFICATIONS AND CONTRACT DRAWINGS

The Specifications and the Contract Drawings for the Project are revised in accordance with the provisions set forth below.

- (1) Owner: Wherever the term "Owner" is used in the Specifications and/or the Contract Drawings, such term 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)
PART I - Contract Requirements

Various Articles of the Contract refer to requirements which are set forth in Schedule A of the General Conditions. The Schedule set forth below specifies the following: (1) the referenced Articles of the Contract, and (2) the specific requirements applicable to the contract.

REFERENCE	ITEM	REQUIREMENTS	CONTRACT #1
Information For Bidders	Bid Security		See Attachment 1 – Bid Information in the Bid Booklet
Information For Bidders	Performance and Payment Bonds		See Attachment 1- Bid Information in the Bid Booklet
Article 14 Contract	Time of Completion	Consecutive Calendar Days	660 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 \$1,000,000 or less 5%
			If 100% bonds are not required, and Contract Price is more than \$1,000,000 10%
Article 24 Contract	Deposit Guarantee	Percent of Contract Price	1%
Article 24 Contract	Period of Guarantee		See Schedule B of the Addendum to the General Conditions
Article 74 Contract	Statement of Work		See Contract Article 74
Article 75 Contract	Compensation to be Paid to Contractor		See Contract Article 75
Article 78 Contract	MWBE Program		See M/WBE Utilization Plan in the Bid Booklet

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Note: All certificate(s) of insurance submitted pursuant to Contract Article 22.3. 3 must be accompanied by a Certification by Broker consistent with Part III below and include the following information:

- For each insurance policy, the name and NAIC number of issuing company, number of policy, and effective dates;
- Policy limits consistent with the requirements listed below;
- Additional insureds or loss payees consistent with the requirements listed below; and
- The number assigned to the Contract by the City (in the "Description of Operations" field).

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Commercial General Liability Art. 22.1.1	<p>The minimum limits shall be \$1,000,000.00 per occurrence and \$2,000,000.00 per project aggregate applicable to this Contract.</p> <p>Additional Insureds:</p> <p>1. City of New York, including its officials and employees, with coverage at least as broad as ISO Forms CG 20 10 and CG 20 37, and</p> <p>2. All person(s) or organization(s), if any, that Article 22.1.1(b) of the Contract requires to be named as Additional Insured(s), with coverage at least as broad as ISO Form CG 20 26. The Additional Insured endorsement shall either specify the entity's name, if known, or the entity's title (e.g., Project Manager).</p> <p>3. _____</p>
■ Workers' Compensation Art. 22.1.2 ■ Disability Benefits Insurance Art. 22.1.2 ■ Employers' Liability Art. 22.1.2 <input type="checkbox"/> Jones Act Art. 22.1.3 <input type="checkbox"/> U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.3	<p>Workers' Compensation, Employers' Liability, and Disability Benefits Insurance: Statutory per New York State law without regard to jurisdiction.</p> <p>Note: The following forms are acceptable: (1) New York State Workers' Compensation Board Form No. C-105.2, (2) State Insurance Fund Form No. U-26.3, (3) New York State Workers' Compensation Board Form No. DB-120.1 and (3) Request for WC/DB Exemption Form No. CE-200. The City will not accept an ACORD form as proof of Workers' Compensation or Disability Insurance.</p> <p>Jones Act and U.S. Longshoremen's and Harbor Workers' Compensation Act: Statutory per U.S. law.</p>

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Builders' Risk Art. 22.1.4	100 % of total value of Work Contractor the Named Insured; the City both an Additional Insured and one of the loss payees as its interests may appear. If the Work does not involve construction of a new building or gut renovation work, the Contractor may provide an installation floater in lieu of Builders Risk insurance. Note: Builders Risk Insurance may terminate upon Substantial Completion of the Work in its entirety.
■ Commercial Auto Liability Art. 22.1.5	\$1,000,000.00 per accident combined single limit If vehicles are used for transporting hazardous materials, the Contractor shall provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90
<input type="checkbox"/> Contractor's Pollution Liability Art. 22.1.6	\$ _____ per occurrence \$ _____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
<input type="checkbox"/> Marine Protection and Indemnity Art. 22.1.7(a)	\$ _____ per occurrence \$ _____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions (Continued)

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
<input type="checkbox"/> Hull and Machinery Insurance Art. 22.1.7(b)	\$_____ per occurrence \$_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
<input type="checkbox"/> Marine Pollution Liability Art. 22.1.7(c)	\$_____ each occurrence Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 <input type="checkbox"/> Ship Repairers Legal Liability	\$_____ each occurrence
[OTHER] Art. 22.1.8 <input type="checkbox"/> Collision Liability/Towers Liability	\$_____ per occurrence \$_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 <input type="checkbox"/> Railroad Protective Liability	\$_____ per occurrence \$_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions (Continued)

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

<div>[OTHER] Art. 22.1.8</div> <div>□ Asbestos Liability _____</div>	<p>Only required of the Contractor or Subcontractor performing any required asbestos removal.</p> <p>\$1,000,000 each occurrence, \$2,000,000 aggregate (Combined Single Limit); only required of the Contractor or Subcontractor performing any required asbestos removal.</p> <p>Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____</p>
<div>[OTHER] Art. 22.1.8</div> <div>■ Boiler Insurance _____</div>	<p>\$200,000</p>
<div>[OTHER] Art. 22.1.8</div> <div>■ Professional Liability</div> <p>In the event any section of the Specifications requires the Contractor to engage a Professional Engineer to provide design and/or engineering services, the Engineer engaged by the Contractor, as well as any sub consultant(s) performing professional services, shall provide Professional Liability Insurance.</p>	<p>\$1,000,000 per occurrence</p> <p>The Contractor's Professional Engineer shall maintain and submit evidence of Professional Liability Insurance in the minimum amount of \$1,000,000 per claim. The policy or policies shall include an endorsement to cover the liability assumed by the Contractor under this Agreement arising out of the negligent performance of professional services or caused by an error, omission or negligent act of the Contractor's Professional Engineer or anyone employed by the Contractor's Professional Engineer.</p> <p>Claims-made policies will be accepted for Professional Liability Insurance. All such policies shall have an extended reporting period option or automatic coverage of not less than two (2) years. If available as an option, the Contractor's Professional Engineer shall purchase extended reporting period coverage effective on cancellation or termination of such insurance unless a new policy is secured with a retroactive date, including at least the last policy year.</p>

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certificates of Insurance

All certificates of insurance (except certificates of insurance solely evidencing Workers' Compensation Insurance, Employer's Liability Insurance, and/or Disability Benefits Insurance) must be accompanied by one of the following:

- (1) the Certification by Insurance Broker or Agent on the following page setting forth the required information and signatures;

-- OR --

- (2) copies of all policies as certified by an authorized representative of the issuing insurance carrier that are referenced in such certificate of insurance. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART IV. Address of Commissioner

Wherever reference is made in Article 7 or Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents 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: Section 01 7839, Article 2.7 of the DDC Standard 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 (Yrs)
074170	tiles and aluminum substructure	5
075323	full roofing system	30
075400	materials	5
	full roofing system	30
075563	membrane and flashing	20
081416	veneer and warping	2
083613	electric operating equipment	5
083616	equipment	1
084013	glazing units & frame finish	5
084313	glazing units & frame finish	5
084413	glass seal	5
	exterior finish	5
088000	IGUs & laminated glass	5
088300	reflective coating	5
089100	coating & finish	10

Specification Number	Material or Equipment	Warranty Period (Yrs)
095423	surface finish	5
114000	equipment, refrigerant & compressors	2
122400	hardware, fabric, finish	1
129333	Thermoplastic Planter Liners	3
142100	elevator equipment and devices	1
211313	Fire Pump	1
223000	Domestic Water Booster	1
	Sewage Ejector Pumps	5
	Elevator Sump Pumps	1
	Gas Booster Pumps	1
	Domestic Hot Water Tanks	1
230513	Variable Frequency Drive	5
230900	Carbon Dioxide Sensor	7
233113	Boiler Flue Vent	1
236450	High Efficiency Boilers	1
	Nederman Exhaust System	1
239900	Vertical loop HDPE pipe & fabricated U bends	50
	Horizontal pipe and fittings	25
	HDPE manifolds, heat fusion joints, brass fittings & valves	1
260971	Lighting Control: System	2
	Lighting Control: Parts, standard	5
	Lighting Control: Parts, extended	8
262400	Electric Service Switchboards	1
262416	Panelboards	1
	Circuit Breakers	1
262923	Disconnect Switches	1
	Starters	1
263214	Emergency Generator	1
	Automatic Transfer Switches	1
264313	TVSS Systems	3
265100	LED luminaires and drivers	2
	Metal finishes	5
	Self-Luminous Signs	20
269000	PV System	1
	PV Modules & Integral Inverters	35
283100	Fire Alarm System	1
321400	Concrete Pavers	3
	Granite Pavers	1
	Pedestal System	3
	Aluminum Edge Restraints	15
323119	Green Fences & Gates	1
323300	Metal Planter / Bench	5
329300	Plants	2
434116	Tank, spill containment manhole, tank gauge & fuel dispenser	1
434117	Fuel piping, valves & vents	1
434118	Electronic leak detection/ inventory control system & all associated sensors & other components	1

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.
- (e) Unless indicated otherwise Warranties are to take effect on the date of Substantial Completion.

SCHEDULE C

Contract Drawings

(Reference: Section 01 1000, Article 1.5 (A) of the DDC Standard General Conditions)

The Schedule set forth below lists all Contract Drawings for the Project.

GENERAL

G-001.00	<u>PROJECT DRAWING INDEX</u>
G-002.00	<u>ABBREVIATION SYMBOLS PROJECT MATERIAL LIST</u>
G-003.00	<u>GENERAL NOTES & SPECIFICATIONS</u>
G-004.00	<u>CODE COMPLIANCE</u>
G-005.00	<u>ZONING ANALYSIS & SUMMARY</u>
G-006.00	<u>ZONING ANALYSIS & SUMMARY</u>
G-007.00	<u>LIFE SAFETY DIAGRAM</u>
G-008.00	<u>SURVEY FOR REFERENCE ONLY</u>
G-009.00	<u>SURVEY FOR REFERENCE ONLY</u>
G-010.00	<u>RECORD OF GEOTHERMAL BORINGS</u>
G-011.00	<u>RECORD OF GEOTHERMAL BORINGS</u>

CIVIL

C-100.00	<u>SITE PLAN</u>
C-100.10	<u>SITE PLAN</u>
C-101.00	<u>EROSION AND SEDIMENT CONTROL PLAN</u>
C-101.10	<u>EROSION AND SEDIMENT CONTROL PLAN</u>
C-102.00	<u>GRADING AND DRAINAGE PLAN</u>
C-103.00	<u>UTILITY PLAN</u>
C-103.10	<u>UTILITY PLAN</u>
C-500.00	<u>DETAILS I</u>
C-501.00	<u>DETAILS II</u>
C-900.00	<u>BPP COVER SHEET</u>
C-901.00	<u>BPP PLAN AND PROFILE</u>
C-902.00	<u>BPP DETAILS</u>

LANDSCAPE

L-101.00	<u>LEVEL 1 PLAN</u>
L-102.00	<u>LEVEL 2 PLAN</u>
L-103.00	<u>ROOF PLAN</u>
L-201.00	<u>PLANTING PLAN - LEVEL 1</u>
L-202.00	<u>PLANTING PLAN - LEVEL 2</u>
L-203.00	<u>PLANTING PLAN - ROOF</u>
L-300.00	<u>WALL ELEVATIONS</u>
L-400.00	<u>LANDSCAPE DETAILS</u>
L-401.00	<u>PLANTING DETAILS</u>
L-402.00	<u>GREEN FENCE DETAILS</u>

<u>L-403.00</u>	<u>GREEN FENCE DETAILS</u>
<u>L-404.00</u>	<u>GREEN FENCE DETAILS</u>
<u>L-405.00</u>	<u>GATE DETAILS</u>

ARCHITECTURAL

<u>A-010.00</u>	<u>SITE PLAN</u>
<u>A-011.00</u>	<u>SITE DETAILS</u>
<u>A-100.00</u>	<u>CELLAR PLAN</u>
<u>A-101.00</u>	<u>LEVEL 1 PLAN</u>
<u>A-102.00</u>	<u>LEVEL 2 PLAN</u>
<u>A-103.00</u>	<u>ROOF PLAN</u>
<u>A-104.00</u>	<u>SKYLIGHT ROOF PLAN</u>
<u>A-200.00</u>	<u>BUILDING ELEVATIONS</u>
<u>A-201.00</u>	<u>BUILDING ELEVATIONS</u>
<u>A-202.00</u>	<u>PATIO AND SKYLIGHT ELEVATIONS</u>
<u>A-203.00</u>	<u>PRECAST CONCRETE PANEL AXONOMETRIC</u>
<u>A-204.00</u>	<u>PRECAST CONCRETE PANEL ELEVATIONS</u>
<u>A-205.00</u>	<u>PRECAST CONCRETE PANEL ELEVATION</u>
<u>A-206.00</u>	<u>FACADE OPENINGS CATALOG</u>
<u>A-207.00</u>	<u>TERRACOTTA PANEL CATALOG</u>
<u>A-300.00</u>	<u>BUILDING SECTIONS</u>
<u>A-301.00</u>	<u>BUILDING SECTIONS</u>
<u>A-310.00</u>	<u>WALL SECTIONS</u>
<u>A-311.00</u>	<u>WALL SECTIONS</u>
<u>A-312.00</u>	<u>WALL SECTIONS</u>
<u>A-400.00</u>	<u>ENLARGED APPARATUS FLOOR & TRAINING TOWER INTERIOR ELEVATIONS</u>
<u>A-401.00</u>	<u>ENLARGED APPARATUS FLOOR & TRAINING TOWER INTERIOR ELEVATIONS</u>
<u>A-402.00</u>	<u>ENLARGED APPARATUS FLOOR & TRAINING TOWER INTERIOR ELEVATIONS</u>
<u>A-403.00</u>	<u>ENLARGED BUNKER GEAR, SHOP AREA, HOUSEWATCH PLAN & ELEVATIONS</u>
<u>A-404.00</u>	<u>ENLARGED KITCHEN/LOUNGE/CONF. ROOM PLAN + ELEVATIONS</u>
<u>A-405.00</u>	<u>ENLARGED LUMBER STORAGE, TOOL STORAGE & DECON AREA</u>
<u>A-406.00</u>	<u>ENLARGED RESTROOM PLANS & ELEVATIONS</u>
<u>A-407.00</u>	<u>ENLARGED RESTROOMS & LOCKERS, PLANS & ELEVATIONS</u>
<u>A-408.00</u>	<u>ENLARGED COMPANY OFFICE INTERIOR PLAN AND ELEVATIONS</u>
<u>A-409.00</u>	<u>ENLARGED DORMITORY & OFFICERS' BUNKROOM PLANS & ELEVATIONS</u>
<u>A-410.00</u>	<u>ENLARGED CORRIDOR, HEALTH AND FITNESS ELEVATIONS</u>
<u>A-500.00</u>	<u>ENLARGED STAIR 01 PLANS & SECTIONS</u>
<u>A-501.00</u>	<u>ENLARGED STAIR 01 ELEVATIONS & SECTIONS</u>
<u>A-502.00</u>	<u>STAIR RAILING DETAILS</u>
<u>A-503.00</u>	<u>ENLARGED STAIR 02 & 03 PLANS</u>
<u>A-504.00</u>	<u>ENLARGED STAIR 02 SECTION</u>
<u>A-505.00</u>	<u>ENLARGED ELEVATOR PLANS & SECTION</u>
<u>A-510.00</u>	<u>PLAN DETAILS</u>
<u>A-511.00</u>	<u>PLAN DETAILS</u>
<u>A-520.00</u>	<u>SECTION DETAILS</u>
<u>A-521.00</u>	<u>SECTION DETAILS</u>

<u>A-522.00</u>	<u>LOWER EXTERIOR STAIR DETAILS</u>
<u>A-523.00</u>	<u>UPPER EXTERIOR STAIR DETAILS</u>
<u>A-530.00</u>	<u>SKYLIGHT DETAILS</u>
<u>A-531.00</u>	<u>TRAINING LADDER & FLAGPOLE DETAILS</u>
<u>A-532.00</u>	<u>BALCONY, CATWALK & SLIDE POLE DETAILS</u>
<u>A-533.00</u>	<u>PV PANEL DETAIL</u>
<u>A-550.00</u>	<u>PORTAL TYPICAL DETAILS</u>
<u>A-551.00</u>	<u>S-A PORTAL</u>
<u>A-552.00</u>	<u>S-B PORTAL</u>
<u>A-553.00</u>	<u>S-C PORTAL</u>
<u>A-554.00</u>	<u>S-D PORTAL</u>
<u>A-555.00</u>	<u>S-E PORTAL SOUTH</u>
<u>A-556.00</u>	<u>S-E PORTAL WEST</u>
<u>A-557.00</u>	<u>E-A PORTAL</u>
<u>A-558.00</u>	<u>E-B PORTAL</u>
<u>A-559.00</u>	<u>E-C PORTAL</u>
<u>A-560.00</u>	<u>E-C PORTAL INT</u>
<u>A-561.00</u>	<u>N-A PORTAL</u>
<u>A-562.00</u>	<u>N-B PORTAL</u>
<u>A-563.00</u>	<u>N-B PORTAL INT</u>
<u>A-564.00</u>	<u>W-A PORTAL</u>
<u>A-565.00</u>	<u>W-B PORTAL</u>
<u>A-566.00</u>	<u>W-C PORTAL</u>
<u>A-567.00</u>	<u>W-D PORTAL</u>
<u>A-568.00</u>	<u>W-E PORTAL</u>
<u>A-600.00</u>	<u>PARTITION TYPES AND DETAILS</u>
<u>A-601.00</u>	<u>PARTITION TYPES AND DETAILS</u>
<u>A-602.00</u>	<u>DOOR TYPES & SCHEDULE</u>
<u>A-603.00</u>	<u>TRANSITION AND BASE DETAILS</u>
<u>A-604.00</u>	<u>EXTERIOR GLAZING SCHEDULE</u>
<u>A-605.00</u>	<u>EXTERIOR GLAZING SCHEDULE</u>
<u>A-606.00</u>	<u>INTERIOR GLAZING SCHEDULE</u>
<u>A-700.00</u>	<u>CELLAR RCP</u>
<u>A-701.00</u>	<u>LEVEL 1 RCP</u>
<u>A-702.00</u>	<u>LEVEL 2 RCP</u>
<u>A-703.00</u>	<u>ROOF RCP</u>
<u>A-800.00</u>	<u>ROOM FINISH SCHEDULE</u>
<u>A-801.00</u>	<u>MILLWORK DETAILS</u>
<u>A-802.00</u>	<u>MILLWORK DETAILS</u>
<u>A-803.00</u>	<u>MILLWORK DETAILS</u>
<u>A-804.00</u>	<u>MILLWORK DETAILS</u>
<u>A-810.00</u>	<u>SIGNAGE DETAILS</u>
<u>A-811.00</u>	<u>SIGNAGE DETAILS</u>
<u>A-900.00</u>	<u>CELLAR FURNITURE PLAN</u>
<u>A-901.00</u>	<u>LEVEL 1 FURNITURE PLAN</u>
<u>A-902.00</u>	<u>LEVEL 2 FURNITURE PLAN</u>

LIGHTING

<u>LT-100</u>	<u>FIXTURE SCHEDULE 1</u>
<u>LT-101</u>	<u>FIXTURE SCHEDULE 2</u>
<u>LT-102</u>	<u>FIXTURE SCHEDULE 3</u>
<u>LT-103</u>	<u>FIXTURE SCHEDULE 4</u>
<u>LT-200</u>	<u>FIXTURE DETAIL 1</u>
<u>LT-201</u>	<u>FIXTURE DETAIL 2</u>
<u>LT-202</u>	<u>FIXTURE DETAIL 3</u>
<u>LT-203</u>	<u>FIXTURE DETAIL 4</u>
<u>LT-204</u>	<u>FIXTURE DETAIL 5</u>
<u>LT-205</u>	<u>FIXTURE DETAIL 6</u>
<u>LT-206</u>	<u>FIXTURE DETAIL 7</u>
<u>LT-207</u>	<u>FIXTURE DETAIL 8</u>
<u>LT-208</u>	<u>FIXTURE DETAIL 9</u>

FOUNDATION

<u>FO-100.00</u>	<u>CELLAR PLAN</u>
<u>FO-101.00</u>	<u>CELLAR CONTROL JOINT PLAN</u>
<u>FO-300.00</u>	<u>FOUNDATION SECTION</u>
<u>FO-301.00</u>	<u>FOUNDATION SECTION</u>
<u>FO-302.00</u>	<u>FOUNDATION SECTION</u>
<u>FO-303.00</u>	<u>LANDSCAPING FOUNDATION SECTIONS</u>
<u>FO-400.00</u>	<u>TYPICAL FOUNDATION DETAILS</u>
<u>FO-401.00</u>	<u>TYPICAL FOUNDATION DETAILS</u>
<u>FO-402.00</u>	<u>TYPICAL FOUNDATION DETAILS</u>

STRUCTURAL

<u>S-001.00</u>	<u>GENERAL NOTES</u>
<u>S-002.00</u>	<u>GENERAL NOTES</u>
<u>S-003.00</u>	<u>LAP SPLICE SCHEDULES</u>
<u>S-004.00</u>	<u>LOADING DIAGRAMS</u>
<u>S-101.00</u>	<u>LEVEL 1 PLAN</u>
<u>S-102.00</u>	<u>LEVEL 2 PLAN</u>
<u>S-103.00</u>	<u>ROOF PLAN</u>
<u>S-104.00</u>	<u>LANTERN ROOF PLAN</u>
<u>S-200.00</u>	<u>BUILDING ISOMETRIC VIEWS</u>
<u>S-201.00</u>	<u>ELEVATIONS - EXTERIOR PRECAST CONCRETE PANELS</u>
<u>S-202.00</u>	<u>ELEVATIONS - STEEL FRAMING AT FACADE OPENINGS</u>
<u>S-210.00</u>	<u>LEVEL 1 REINFORCING PLANS</u>
<u>S-300.00</u>	<u>CONCRETE SHEAR WALL SECTIONS</u>
<u>S-301.00</u>	<u>CONCRETE SHEAR WALL SECTIONS</u>
<u>S-310.00</u>	<u>TYPICAL CONCRETE SHEAR WALL DETAILS</u>
<u>S-400.00</u>	<u>CONCRETE COLUMN AND BEAM SCHEDULE</u>
<u>S-410.00</u>	<u>TYPICAL CONCRETE COLUMN DETAILS</u>
<u>S-420.00</u>	<u>TYPICAL CONCRETE BEAM DETAILS</u>
<u>S-430.00</u>	<u>TYPICAL CAST IN PLACE CONCRETE SLAB DETAILS</u>

<u>S-431.00</u>	<u>TYPICAL CAST IN PLACE CONCRETE SLAB DETAILS</u>
<u>S-440.00</u>	<u>TYPICAL PRECAST CONCRETE DETAILS AND SECTIONS</u>
<u>S-450.00</u>	<u>CONCRETE SECTIONS</u>
<u>S-451.00</u>	<u>CONCRETE SECTIONS</u>
<u>S-452.00</u>	<u>CONCRETE SECTIONS</u>
<u>S-500.00</u>	<u>TYPICAL STEEL DETAILS</u>
<u>S-510.00</u>	<u>STEEL SECTIONS</u>

SUPPORT OF EXCAVATION

<u>SOE-101.00</u>	<u>UNDERPINNING NOTES AND SITE PLAN</u>
<u>SOE-201.00</u>	<u>UNDERPINNING PART PLAN, ELEVATION, AND SECTIONS</u>
<u>SOE-301.00</u>	<u>UNDERPINNING DETAILS</u>

MECHANICAL

<u>M-001.00</u>	<u>MECHANICAL SYMBOLS, ABBREVIATIONS AND NOTES</u>
<u>M-100.00</u>	<u>MECHANICAL CELLAR FLOOR PLAN</u>
<u>M-101.00</u>	<u>MECHANICAL FIRST FLOOR PLAN</u>
<u>M-102.00</u>	<u>MECHANICAL SECOND FLOOR PLAN</u>
<u>M-103.00</u>	<u>MECHANICAL ROOF PLAN</u>
<u>M-105.00</u>	<u>HVAC SCHEDULES</u>
<u>M-106.00</u>	<u>HVAC SCHEDULES 2</u>
<u>M-107.00</u>	<u>HVAC SCHEDULES 3</u>
<u>M-108.00</u>	<u>MECHANICAL DETAILS</u>
<u>M-109.00</u>	<u>MECHANICAL DETAILS 2</u>
<u>M-110.00</u>	<u>MECHANICAL DETAILS 3</u>
<u>M-111.00</u>	<u>MECHANICAL DETAILS 4</u>
<u>M-112.00</u>	<u>RISER DIAGRAMS</u>
<u>M-113.00</u>	<u>DUST COLLECTION DETAILS</u>
<u>M-114.00</u>	<u>NEDERMAN DETAILS</u>

GEOHERMAL

<u>GT-100.00</u>	<u>GEOHERMAL SYSTEM SITE PLAN</u>
<u>GT-101.00</u>	<u>GEOHERMAL SYSTEM DETAILS</u>

ENERGY

<u>EN-200.00</u>	<u>MECHANICAL ENERGY COMPLIANCE DOCUMENTATION</u>
<u>EN-201.00</u>	<u>ELECTRICAL ENERGY COMPLIANCE DOCUMENTATION</u>

ELECTRICAL

<u>E-001.00</u>	<u>ELECTRICAL SYMBOL, LIST, ABBREVIATIONS AND GENERAL NOTES</u>
<u>E-002.00</u>	<u>ELECTRICAL RISER DIAGRAM</u>
<u>E-003.00</u>	<u>PHOTOVOLTAIC SYSTEM WIRING DIAGRAMS</u>
<u>E-004.00</u>	<u>ELECTRICAL DISTRIBUTION SCHEMATIC RISER DIAGRAM, HARDWARE & CONDUIT SCHEDULE</u>
<u>E-005.00</u>	<u>HOUSE WATCH SWITCH PANEL DETAIL, SCHEDULE AND WIRING DIAGRAMS</u>
<u>E-006.00</u>	<u>LOW VOLTAGE AND FIRE COMMUNICATIONS SYSTEM RISER, HARDWARE AND CONDUIT SCHEDULE</u>

E-007.00	<u>GOLD BOX RED PHONE & VA/TA RISER AND WIRING DIAGRAMS</u>
E-008.00	<u>ALARM BELL, VOICE/DATA AND CATV RISER DIAGRAM, AND DOOR ANNUNCIATOR WIRING DIAGRAM</u>
E-100.00	<u>CELLAR POWER PLAN</u>
E-101.00	<u>LEVEL 1 FLOOR POWER PLAN</u>
E-102.00	<u>LEVEL 2 FLOOR POWER PLAN</u>
E-103.00	<u>ROOF POWER PLAN</u>
E-104.00	<u>TOP OF PARAPET POWER PLAN</u>
E-200.00	<u>CELLAR LIGHTING PLAN</u>
E-201.00	<u>LEVEL 1 LIGHTING PLAN</u>
E-202.00	<u>LEVEL 2 LIGHTING PLAN</u>
E-203.00	<u>ROOF LIGHTING PLAN</u>
E-300.00	<u>CELLAR LOW VOLTAGE & FIRE COMMUNICATIONS SYSTEMS PLAN</u>
E-301.00	<u>LEVEL 1 LOW VOLTAGE & FIRE COMMUNICATIONS SYSTEMS PLAN</u>
E-302.00	<u>LEVEL 2 LOW VOLTAGE & FIRE COMMUNICATIONS SYSTEMS PLAN</u>
E-400.00	<u>DETAILS SHEET #1 LOW VOLTAGE</u>
E-401.00	<u>DETAILS SHEET #2 ELECTRICAL</u>
E-402.00	<u>DETAILS SHEET #3 LIGHTING CONTROLS AND SCHEDULE</u>
E-403.00	<u>DETAILS SHEET #4 LIGHTING CONTROL WIRING DIAGRAMS & DETAILS</u>
E-500.00	<u>PANEL SCHEDULES</u>

FIRE ALARM

FA-001.00	<u>FIRE ALARM SYSTEM SYMBOL LIST, SEQUENCE OF OPERATIONS & NOTES</u>
FA-002.00	<u>FIRE ALARM SYSTEM RISER DIAGRAM</u>
FA-003.00	<u>FIRE ALARM SYSTEM DETAILS</u>
FA-100.00	<u>CELLAR FIRE ALARM PLAN</u>
FA-101.00	<u>LEVEL 1 FIRE ALARM PLAN</u>
FA-102.00	<u>LEVEL 2 FIRE ALARM PLAN</u>
FA-103.00	<u>ROOF FIRE ALARM PLAN</u>

PLUMBING

P-001.00	<u>PLUMBING SYMBOLS, NOTES, LEGEND & ABBREVIATIONS</u>
P-100.00	<u>PLUMBING CELLAR FLOOR PLAN</u>
P-101.00	<u>PLUMBING FIRST FLOOR PLAN</u>
P-102.00	<u>PLUMBING SECOND FLOOR PLAN</u>
P-103.00	<u>PLUMBING ROOF PLAN</u>
P-104.00	<u>PLUMBING ROOF PLAN</u>
P-300.00	<u>PLUMBING SOLAR HOT WATER SYSTEM</u>
P-601.00	<u>PLUMBING SANITARY RISER DIAGRAM</u>
P-610.00	<u>PLUMBING DOMESTIC WATER RISER DIAGRAM</u>
P-620.00	<u>PLUMBING STORM WATER RISER DIAGRAM</u>
P-630.00	<u>PLUMBING GAS RISER DIAGRAM</u>
P-700.00	<u>PLUMBING DETAILS</u>
P-800.00	<u>PLUMBING SCHEDULE SHEET NO. 1</u>
P-801.00	<u>PLUMBING SCHEDULE SHEET NO. 2</u>
P-802.00	<u>PLUMBING SCHEDULE SHEET NO. 3</u>

FIRE PROTECTION

<u>FP-001.00</u>	<u>FIRE PROTECTION SYMBOLS, NOTES, LEGEND & ABBREVIATIONS</u>
<u>FP-100.00</u>	<u>FIRE PROTECTION CELLAR PLAN</u>
<u>FP-101.00</u>	<u>FIRE PROTECTION FIRST FLOOR PLAN</u>
<u>FP-102.00</u>	<u>FIRE PROTECTION SECOND FLOOR PLAN</u>
<u>FP-103.00</u>	<u>FIRE PROTECTION ROOF PLAN</u>
<u>FP-601.00</u>	<u>FIRE PROTECTION RISER DIAGRAM</u>
<u>FP-700.00</u>	<u>FIRE PROTECTION DETAILS No 1</u>

FUEL

<u>F-001.00</u>	<u>DIESEL FUEL SYSTEM GENERAL NOTES AND EQUIPMENT LIST</u>
<u>F-100.00</u>	<u>DIESEL FUEL SYSTEM PLAN CELLAR LEVEL</u>
<u>F-101.00</u>	<u>DIESEL FUEL SYSTEM PLAN LEVEL 1</u>
<u>F-201.00</u>	<u>DIESEL FUEL SYSTEM DETAILS</u>
<u>F-202.00</u>	<u>DIESEL FUEL SYSTEM DETAILS</u>
<u>F-203.00</u>	<u>DIESEL FUEL SYSTEM DETAILS</u>

SCHEDULE D

Electrical Motor Control Equipment

(Reference: 01 3506, Article 3.8 of the DDC Standard General Conditions)

Requirements for electrical motor equipment may be included in one or more sections of the Specifications for the Contract for the Project. Schedule D set forth below delineates specific information for electrical motor control equipment. In the event of any conflict between the Specifications and this Schedule D, Schedule D 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.

DB Disconnect Circuit Breaker (Switch) P Pilot Light
TS Thermal Switch F Firestat
MS Magnetic Starter T Thermostat
CMS Comb. Mag. Starter 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:
HV-1	Mechanical Rm 002	1	2 HP (x2)	208/1	CMS	Supply and exhaust fan 2 HP each
FC-12	Elevator Machine Rm	1	.076 kW	208/1	HOA	
FC-13	Telecom Rm	1	.182 kW	208/1	HOA	
COND-2	Roof	1	FR	208/1	MS	
KX-MUA	Roof	1	1/3 HP	208/3	HOA	
ERV-1	Roof	1	2 HP (x2)	208/3	CMS	Supply and exhaust fan 2 HP each
UH-A	Apparatus Bay	2	1/6 HP	208/3	HOA	
UH-B	Lower Level and Training Tower	6	1/40 HP	208/3	HOA	
UH-C	First Floor	6	1/20 HP	208/3	HOA	
UH-E	Stairs	2	1/15 HP	115/1	HOA	

UH-F	Gas Meter Rm and Elec. Rm	2	1/4 HP	208/1	HOA	
FC-1	Conference Room	1	.118 kW	208/1	HOA	
FC-2,4,6,7	House Watch, Study Rm, Officers Lockers, Officers Bunk	4	.118 kW	208/1	HOA	
FC-3	Kitchen	1	.37 kW	208/1	HOA	
FC-5,8,10	Company Office, Corridor, Health and Fitness	3	.390 kW	208/3	HOA	
FC-9,11	Dorm, FF Lockers	2	.118 kW	115/1	HOA	
COND-1	Roof	1		208/3	MS	
NE-1	Roof	1	10 HP	208/3	MS	
KX-1	Roof	1	1/2 HP	208/1	CMS	
GX-1	Roof	1	1/6 HP	115/1	HOA	
GX-2	Roof	1	1/6 HP	115/1	HOA	
GX-3	Roof	1	1/6 HP	115/1	HOA	
AX-1 & 2	Apparatus bay	2	3 HP	208/3	CMS	
DX-1	Roof	1	1/6 HP	115/1	HOA	
SP-1	Roof	1	3 HP	208/3	CMS	
DC-1	Shop Area	1	5 HP	208/3	DB	
DC-2	Portable	1	1.5 HP	115/1	DB	
GWP-1&2	Geothermal 016	2	5 HP	208/3	HOA	
HWP-1&2	Mechanical Rm 014	2	.178 kW	115/1	HOA	
DBP-1,2 &3	Mechanical Rm 014	3	.045 kW	208/3	HOA	
FPP-1	Mechanical Rm 015	1	.045 kW	208/3	HOA	
C-1	Shop Area	1	5 HP	208/1	DB	
GBP-1,2 &3	GAS SERVICE Rm	2	.045 kW	208/3	HOA	

SCHEDULE E
Separation of Trades

NOT USED FOR SINGLE CONTRACTS

SCHEDULE F

Submittals Schedule

(Reference: Section 01 3300 Article 1.5 (C) of the General Conditions)

The Schedule set forth below lists all submittal requirements for the 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:

TELEPHONE NUMBER:

DDC PROJECT MANAGER:

TELEPHONE NUMBER:

DATE:

APPROVED:

(DDC RESIDENT ENGINEER/CPM)

REPORT DATE		FMS ID #/PROJECT ID #: CONTRACT REGISTRATION #: PROJECT NAME:			Contract 1 - GENERAL CONSTRUCTION									
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL		SUB. DATE	REQ'D DEL.	FABRIC. TIME	TRADE: SHOP DRAWING LOG SHEET #						
			SHOP DWG	SAMPLE				SUBMISSIONS						
				CAT CUTS				REC'D	RET'D	ACTION	REC'D	RET'D	ACTION	
01 3526	Safety and Health Program	X												
01 3526	Contractor's Safety Plan	X												
01 5000	Site Plan		X											
01 5000	Reports	X												
01 5423	NYC DOB Scaffold & Sidewalk Shed Permits	X	X											
01 5423	Site Logistics/Site Safety Plan	X												

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APPENDIX
GEOTECHNICAL REPORT

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CONTRACT # 1
GENERAL CONSTRUCTION WORK

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SECTION 01 3126 - BIM PROTOCOL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The FDNY New Firehouse for Rescue Company 2 Project shall utilize 3D Modeling for the coordination of all Structural Steel, Mechanical, Plumbing, Fire Protection, Electrical, Low Voltage Systems and Exterior Envelope. The 3D coordination shall be based on a coordinated design.
- B. This specification covers the intended scope for New Firehouse for Rescue Company 2 using BIM for construction purposes. The General Contractor will develop a coordinated clash-free Model including Structure, Architecture and complete MEP services. The Construction Model will be used to generate all Shop Drawings that is directly referencing the Model. The coordinated Construction Model will be used to generate points for automated layout stations which ensure that the installation is accurate and verified. The scope also includes the production of a dimensionally accurate As-Built Model including embedded Facilities Management data compatible with the Commissioner's facilities data standards.
- C. The General Contractor agrees to participate in the use of digital/computer based three dimensional models and other related functionality, generally referred to as Building Information Modeling (such models and functionality are referred to herein as BIM) as the Commissioner may determine to be beneficial for use in facilitating coordination, sequencing, scheduling and production of as-built depictions of the Project and performance of the Work and as hereafter provided. The General Contractor's costs of such participation are included in the contract amount unless explicitly outlined herein. The costs shall include, but not be limited to, licensing, additional programs, software, seminars and design participation meetings.
- D. The Commissioner does not waive any of its intellectual property rights and shall have the sole and exclusive right to use the BIM and all submissions made by the General Contractor as it deems appropriate, whether during or after construction.
- E. General Contractor agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the General Contractor of its responsibilities under the contract, including to (i) coordinate its Work with the work of others involved in the Project and (ii) strictly comply with the other requirements of the Subcontract Agreement and the Contract Documents. It is expressly understood and agreed that, notwithstanding the requirement for submittals in connection with the BIM, traditional shop drawings and other submissions shall be required of General Contractor as per the Contract Documents. In addition, no party shall be liable to the other for any claim, dispute, controversy, cost or expense arising solely out of the use of the BIM.
- F. General Contractor agrees that notwithstanding the fact that it may participate in the BIM process or receive information or materials from others in connection with the Project through the course of the use or development of the BIM, it shall not take any position that the receipt of such participation or information has or will, in any respect, operate to waive, release or otherwise invalidate any of its obligations or responsibilities under the Subcontract or any intellectual property rights (copyrights,

trademarks/logos, patents, and other legal constraints) that may apply to such information or materials.

- G. General Contractor acknowledges and agrees that the Commissioner shall incur no responsibility or liability with respect to the BIM or the use thereof, including that resulting from errors, omissions or deficiencies in the BIM. In the event that General Contractor provides deficient information or data that does not represent the Work it will be ultimately providing, that is corrupted, that contains a virus and/or that otherwise damages the BIM, General Contractor shall bear all costs associated with reconstructing the BIM and to otherwise remediate such deficiencies or their effects.

1.02 RELATED DOCUMENTS

- A. DDC General Conditions
- B. Reference Standards
1. Level of Development (LOD) Specification 2014 - bimforum.org/lof/
 2. National BIM Standard V3 - www.nationalbimstandard.org

1.03 DEFINITIONS

- A. General
1. Building Information Modeling (BIM) - the process of creating data rich digital representations of the physical and functional characteristics of a facility.
 2. Virtual Design & Construction (VDC) - Information technologies used for effective BIM delivery.
- B. Models
1. Information Model - The definition of the BIM product
 2. Design Intent Model - An Information Model based on the design drawings. It is not intended for construction but provided to the General Contractor as a basis of creating the Construction Model.
 3. Construction Model - It is a composite of the Discipline Model.
 4. Discipline Model(s) - BIM generated by each discipline or trade required on this Project. A Discipline Model may be comprised of multiple Models representing the various subsets of each discipline or trade.
 5. As-built Model - The Revit Model developed by the General Contractor at the completion of which is turned over to the Commissioner.
- C. "Facility Data" or "Attribute Data" or "FM" means any of the data which is represented by, used for, or associated with the BIM Models for the entire building cycle of the facility, including design, construction and facility management.
- D. "P6" means Primavera version 6.

1.04 BIM SUBMITTALS

- A. This table describes submittals by the GC that has to be approved prior to initiating any modeling. Approval means approval by the Commissioner.

ITEM NO.	PARAGRAPH NO.	SUBMITTAL	ACTION
1.	2.02	GC BIM MANAGER'S RESUME	APPROVAL
2.	2.03	BIM IMPLEMENTATION PLAN	APPROVAL
3.	2.01	P6 ACTIVITY CODES	APPROVAL

1.05 QUALITY ASSURANCE

- A. The BIM Manager shall have the following qualifications:
1. Minimum 3 years of experience in 3D Modeling construction Models for projects of the same size and complexity, coordination between subcontractors and design team, and managing of virtual design and construction process.
 2. Technical knowledge of Virtual design and Construction methodologies and BIM application used, related systems and network infrastructure, and awareness of new technologies.
 3. Versed in LOD 2014 and National BIM standards v3.
- B. The BIM Manager shall also have the following skills:
1. Understanding of project workflows and project management.
 2. Communication and instruction skills (verbal and written).
 3. Strong teaching and coaching skills to bring new team members up to speed.
 4. Flexibility and ability to understand and implement BIM standards with a multifaceted construction team and manage the delivery of quality products throughout the process of construction.

PART 2 EXECUTION

2.01 GENERAL CONTRACTOR SCOPE OF WORK

- A. The GC will be provided a Design Intent Model consisting of Architecture, Structure and MEP trades in LOD 300.
- B. The GC shall provide digital submissions of information describing its respective Work in a form and manner that the Commissioner may require, and that can be loaded into a BIM assembled by the Commissioner.
- C. The use of any of the electronic files provided by the Commissioner who may provide them to the GC in preparation of the Construction Model will be at the GC's sole risk and the GC shall indemnify, defend and hold the Commissioner harmless from any and all claims, losses, damages, and costs (including but not limited to reasonable attorneys' fees and professional and administrative time at regular hourly rates) in any way arising out of or in connection with the use of the BIM files.
- D. The GC will detach and create their own Construction Model at their own risk. The GC will work collaboratively with the Commissioner to insure all field conditions are accurately documented in the Construction Model and insure that they are using the most up to date A/E documents for construction phase coordination.

- E. The GC may not rely on the accuracy of the Design Intent Model. The Design Intent Model can be used for reference only and all dimensions must be retrieved from the hard copy Drawings and verified by the GC.
- F. The GC's Construction Model shall be coordinated with the Design Intent Drawings. Any conflicts with the Models that need to be resolved prior to fabrication and construction shall be reported to the Design Team in the form of a Request for Information (RFI). Clash reports may also be issued by the GC as background information for RFI's and submittals.
- G. Include required clearances for maintenance and other access, code clearances and other required clearances.
- H. Clash detection and analysis: Perform on-going clash detection to identify and highlight spatial conflicts within and between the various trades and the building.
- I. Perform NavisWorks clash detection using current subcontractor Construction Models, tracking file versions used in each clash analysis.
- J. Work collaboratively with subcontractors to recommend potential solutions to conflicts.
- K. Indicate where conflict resolution requires modification of design requirements by Commissioner.
- L. Prior to creating the construction schedule, submit four types of P6 activity codes lists indicating the following:
 - 1. Location
 - a. Elevation (level)
 - b. Grid or Room
 - 2. Work Element Category
 - 3. Activity Descriptions
- M. Create an As-built Models in Revit that includes complete structure, architecture Models to LOD 300. MEP equipment and accessories that require FM attribute will be modeled to LOD 300. The Models will be populated with Facilities data using Revit parameters provided by the Commissioner. Any ducts and pipes generated using CAD based authoring software will be linked in as reference to the Revit Model.
- N. The GC shall provide the Commissioner with all the necessary access to review the documents and interface with GC's team. Coordination meetings as per the coordination schedule shall occur between the Commissioner and GC to ensure the correct development of the Construction Model. All submitted BIM Models and associated Attribute Data (Facility Data) shall be fully compatible with Autodesk Revit BIM per paragraph 3.01. Steel and MEP shop drawings shall be generated from the 3D Model(s) prepared by the GC and Subcontractors.
- O. Utilize the Construction Model to generate layout points for automated layout stations so the installation can be laid out and verified to ensure proper positioning per the coordinated construction Model.
- P. Allow real time access to the Construction Model by the Commissioner.
 - 1. Within 30 days of Notice to Proceed, provide a total of eight (8) licenses of Autodesk 360 Glue for the Commissioner teams disposal and upload the Revit and Navisworks NWD files on a weekly basis.

2. The GC shall maintain and provide user accounts and folders/workspaces where each organization producing Construction Models can upload the Construction Model files for Coordination.
3. During the coordination phase weekly publish all clash reports and current versions of all Coordination Models, with clash views, in .nwd format to the collaboration website.

2.02 TRADE COORDINATION PROCESS

- A. Once the Architectural/Structural models are posted on Commissioner Collaboration and data management platform, each trade is required to download and use these files to create their system models by sequence or geographic area as dictated by the Commissioner. The process is to create and upload system models to the Collaboration and data management platform as frequently as required by Commissioner for other trades to use while modeling their systems. Commissioner's BIM coordination process in many respects follows a traditional sequence of drawing / modeling those systems with the most constraints on their routing, and then following with those trades that have more flexibility in their placement. Coordination will be expected to start as soon as contracts are awarded, and developed according to the typical sequencing, as follows:
 1. Duct will be laid out in conformance with the design documents. Locations in which floor size permits, duct layout is to flow systematically across the floor allowing other trades to follow behind drafted areas.
 2. Thereafter all pitched plumbing systems are to be laid out and coordinated with the ductwork.
 3. Once duct and pitched pipe are coordinated, other major (3"+) constrained trade systems' components, including all HVAC, Fire Protection, electrical cable tray, conduit racks, plumbing racks, are to be drawn /modeled and coordinated.
 4. Upon completion of modeling and coordination of major system components of the constrained trades, the "minor" components are to follow including branch piping & smaller conduit runs.
- B. Each Subcontractor is required to have access to Autodesk Navisworks software. The NavisWorks software is required to compile the multiple model drawings, and for the subcontractor to run their own clash detection analysis. It is also required that the coordination representative for each trade shall be equipped with a laptop and a Navisworks license with which to attend coordination meetings. This subcontractor coordination representative shall be authorized and prepared to make live, real-time changes to the "Shop Model" in these coordination meetings, in order to review the finalized, signed off coordinated models prior to and during the fabrication/installation process.
- C. Each Trade is required to run the clash detection analysis for their respective trade system against the Architectural/Structural design models, to ensure that there are no conflicts between the architectural/structural elements and their system(s).
- D. Each Trade is required to post to the Commissioner Collaboration and data management platform, up-dated drawings/models at least once per week, and prior to the clash detection analysis run by the BIM Coordinator / Gatekeeper (day and time to be determined). This will continue until the area is completely coordinated.
- E. The clash reports will be run for MEP systems in conflict with other trades and systems. A clash analysis report will be generated by the BIM Coordinator / Gatekeeper, which involves reviewing each individual clash and documenting it, by saving the appropriate viewpoints. The Coordinator / Gatekeeper will create a NavisWorks .NWD file showing the clash viewpoints & corresponding Word Document showing clashes. This Clash report & NavisWorks .NWD file will be

- posted to the Collaboration and data management platform by the Coordinator / Gatekeeper, who will issue a corresponding notice to all parties involved that the report is posted. Alternatively, the Commissioner may elect to have the HVAC Subcontractor take the LEAD role as the "BIM Gatekeeper", and run the clash detection analysis as frequently as required for all systems modeled.
- F. Each Trade is required to review the clash detection report generated by the BIM Coordinator / Gatekeeper prior to each coordination meeting and attend each meeting prepared to address the unresolved clashes in a constructive manner.
- G. Each Trade is required to collaborate with each other trade through e-mail, telephone, and in person, to resolve basic clashes outside of the Coordination meetings. It is expected that the daily/weekly Coordination meetings are held to address difficult work in areas that are not easily coordinated between the multiple trades themselves. At these meetings, the resolution will be collectively agreed upon, and a trade will be identified as having to "move". This trade will adjust its respective model, and repost it with enough time for other subcontractors to review prior to the upcoming meeting. All the remaining trades are responsible to update and post the changes agreed upon at the coordination meeting with-in 1 week or as directed by Commissioner.
- H. Each Trade is required to submit the number of copies of their respective, coordinated systems in a 2-Dimensional format as required by their contract, for approval through the regular submittal process. This is required for each floor as well as each riser. In addition to the development of 3-Dimensional coordination models, all trade subcontractors are responsible for producing a traditional 2-Dimensional coordination drawing, after cleaning up all resolved clashes and collisions. In the preparation of the final composite 2-Dimensional coordination drawings, large scale details, as well as cross and longitudinal sections developed at Coordination Meetings, shall be made by the subcontractor as required to fully delineate all conditions. The final Coordination CAD drawing file will be re-circulated through all trades after a BIM sign-off meeting. This electronic coordination drawing file shall include all coordinated drawing information, be fully dimensioned (especially elevation dimensions), and include text, tags, and any other required or pertinent indications.
- I. The HVAC Subcontractor is required to compile and plot the number of color copies of the 2-Dimensional, multi-trade, coordinated drawings required by the contract documents for approval through the regular submittal process. This is required for each floor as well as each riser.
- J. Each Trade is required to maintain and provide the 3-Dimensional Model with respect to generating As-Built Drawings/Models. It is the responsibility of each trade to update their respective 3-Dimensional Model throughout the construction, in order to reflect field conditions and accurately document As-built conditions.
- K. Each Trade is required to submit three copies of CD's containing the 3-Dimensional As-Built models, once all issues are addressed from items above. This CD shall contain As Built models in Autodesk .DWG and .NWD formats, as well as including the original authoring files in the native format of the program that created the models. Commissioner reserves the right to request additional file formats as the needs of the client or project require.
- L. Each Trade is required to update and post any changes to their models, originating from RFI's, Submittal's and Bulletin's that have changed their perspective work. Each Trade making changes shall post the revised model onto the Collaboration and data management platform site, and send out a corresponding notice indicating the changes and reasoning behind the change within two weeks from receipt of changes.

- M. Each Trade is required to draw in a format that a 3rd party individual can highlight and track progress of work by selecting individual items in each trade's model through Navisworks.
- N. Each Trade is required to attend a separate bi-monthly meeting to review accessibility of equipment, devices, panels, valves, or other materials and equipment above ceiling with the Commissioner. Under separate drawing layer for the above listed items, each Trade is responsible to provide and identify Access doors and Accessibility requirements for maintenance purposes.
- O. Change Order / Bulletin Process: The process for quantifying and correcting clashes caused by a design change to a signed off and in-progress area is as follows:
 - 1. Trade(s) that have work directly affected by the bulletin documents will take the lead in modeling the revised 3-Dimensional layout, minimizing the clashes with other trades. Revised layouts are to be Modeled in an identifiable layer, and labeled to match the respective bulletin.
 - 2. Once the work is drafted by the affected trade(s), a clash report is to be prepared by the BIM Coordinator / Gatekeeper with all the latest posts.
 - a. While running the clash detection feature in NavisWorks, the Coordinator / Gatekeeper will turn on the 'links view' option, and all clashes are labeled while navigating through the model.
 - b. The Coordinator / Gatekeeper will audit and report the clashes that are local to the area affected by the change documents, similar to the analysis of detected vs. reported clashes in preparation for weekly clash reports.

2.03 MISCELLANEOUS REQUIREMENTS

- A. Coordination is the responsibility of all subcontractors. Commissioner will hold meetings as required, which subcontractors must attend. Failure to attend will result in work by the absent subcontractor on sheets reviewed at meeting being declared improperly coordinated, and will require the Subcontractor to relocate work as shown by Commissioner, or to field run the work not coordinated.
- B. No extra compensation will be paid to any subcontractor for relocating any duct, pipe, conduit, or other material that has been installed without proper coordination between all the subcontractors and the trades involved. If any improperly coordinated work, or work installed that is not in accordance with the approved coordination composites, necessitates additional work by other subcontractors, the cost of such additional work shall be assessed to the subcontractor responsible as determined by Commissioner. Errors due to a failure of attendance at coordination meetings, will be resolved by the subcontractor at his own expense. Where agreements cannot be reached, Commissioner will furnish a resolution. The subcontractor will bear the expense of said resolution.
- C. All work on the coordination drawings (including 3D models) shall be performed by competent draftsmen in a clear legible manner utilizing standard industry conventions. All trade subcontractors shall be responsible for providing their coordination drawing files according to the established coordination schedule. It is the responsibility of each subcontractor to supply a sufficient number of draftsmen, so as not to delay the BIM 3-Dimensional coordination process and shop drawing submittals.
- D. Coordination drawings are not to be construed as and not to relieve each subcontractor from their shop drawing obligations required under the project specifications, and are distinctly separate from the requirements to provide final "As-Built" drawings.

- E. All files supplied by the Commissioner will be as AutoDesk.dwg file format and be readable by other trades' CAD system and NavisWorks. Being 'readable' means the ability to open a file without any errors (such as proxy, xref resolution, geometry error) and with objects, layers, and other file properties remaining intact. In addition all drawing files shall be saved down to the lowest common version which is 2007 file format.
- F. The trade subcontractors are responsible for providing 3-Dimensional solid or surface models (not line & wireframe models) that represents the actual dimensions of the trade system elements and the equipment that will be installed.
- G. It is critical that all trade subcontractors use a mandated file naming convention for their CAD file's name to track the version and date by each trade. Commissioner will provide the detailed file naming convention to all MEP subcontractors. An example would be as follows:
 - 1. "Project Responsibility Phase Trade Floor Area Version Date".
 - 2. Any files that do not follow the file naming convention will be deleted and removed from the server at any time without any notification.
- H. All trade subcontractors' drawing and model files shall be based on an origin point provided by Commissioner. The cost of any changes required by the Trade Subcontractor to their drawings or models due to the use of an unauthorized origin shall be borne by the trade subcontractor.

2.04 GENERAL CONTRACTOR BIM MANAGER

- A. The GC shall designate an expert individual, subject to the approval of the Commissioner to manage and interface between all Subcontractors and Commissioner. Duties includes enforce the DDC CAD Standards to ensure the quality of BIM process during the development of the Construction Model.
- B. BIM Manager Qualifications:
 - 1. Understanding of project workflows and project management.
 - 2. Minimum 3 years of experience in 3D Modeling construction Models for projects of the same size and complexity, coordination between subcontractors and design team, and managing of virtual design and construction process.
 - 3. Technical knowledge of Virtual design and Construction methodologies and BIM application used, related systems and network infrastructure, and awareness of new technologies.
 - 4. Versed in standards such as LOD 2014 & National BIM standards v3.
 - 5. Communication and training skills (verbal and written).
 - 6. Strong teaching and coaching skills to bring new team members up to speed.
 - 7. Flexibility and ability to understand and implement BIM standards with a multifaceted construction team and manage the delivery of quality products throughout the process of construction.

2.05 BIM IMPLEMENTATION PLAN

- A. The Construction BIM Manager shall prepare the BIM Implementation Plan (BIM Plan) for the entire construction process including the updating of As-Built Models. This Plan at minimum shall include the following:
 - 1. General Requirements of Subcontractors
 - 2. Model Partitioning,
 - 3. Software Versioning, File Format & Naming for all Models.

4. List of Construction Models to be developed.
 5. Organization and Contact Information of BIM coordinator responsible for each Construction Model.
 6. Any Required Software Object Enablers.
 7. Common Coordinate Systems and Units.
 8. Assurance that the fonts, dimensions, line styles, levels and other contract document formatting issues follow DDC CAD Standard and the MTA/ BIM Workspace requirements.
 9. Strategy for achieving transfer from FM-Model into Commissioner specified forms.
 10. List of Facility Data-set and Parameters included in the FM Model.
 11. Strategy for recording the As-Built Model on an on-going basis.
 12. Description of data storage and data exchange, sharing, viewing, modeling protocols, and updating of information by Subcontractors.
 13. Milestones of quality control checking and reporting on the integrity of the Models to the Commissioner (Monthly).
 14. Protocols for the Process of RFI's, Shop Drawings, and Record Keeping.
 15. Design-Change Tracking Strategy.
 16. The BIM Template format adopted by the GC shall be submitted and approved by the Commissioner.
 17. The Structure and Organization of the Models shall be approved by the Commissioner.
 18. Naming conventions of Components, work-sets (BIM) and Layers (CAD)
 19. Coordination/Clash Detection Process
 20. Coordination/Clash Detection Schedule
 21. Strategy for using BIM layout tools such for total stations to layout and verify positioning of installation.
 22. Strategy for how the layout data will be used to update the as-built Model.
 23. List of Clashes to be run including tolerances for each component category.
- B. The GC/BIM Manager shall, within 8 weeks after the Award of the Contract, present the Plan for the Commissioner's review. The Commissioner shall confirm acceptability of the Plan or advice as to additional processes and/or activities necessary to be incorporated into the Plan. If modifications are required, the Contractor shall execute the modifications and resubmit the final Plan for Commissioner's acceptance.

2.06 BIM KICKOFF MEETING

- A. The Commissioner shall schedule and conduct a BIM Kickoff Meeting. BIM Modeling work by subcontractors shall not commence prior to the BIM Kickoff Meeting. The Meeting shall review BIM requirements, standards and responsibilities.
- B. Attendees: Participants in the BIM Kickoff Meeting shall be familiar with the project and shall be authorized to conclude matters relating to the BIM work. At a minimum include representatives of the following parties or their designated representatives:
1. Commissioner
 2. GC's Project Manager
 3. GC's BIM Coordinator
 4. GC's BIM Coordinator
 5. BIM Coordinators of all subcontractors producing Construction BIMs

6. Project Coordinators of all subcontractors producing Construction BIMs
- C. Agenda: Subjects for discussion shall include items significant to the effective use of BIM coordination techniques and correct production of Construction BIM, including but not limited to the following:
 1. BIM expectations and project goals
 2. Coordination process
 3. Review of BIM Plan, including Model contents and standards
 4. Requirement to deliver equipment data in electronic format
 5. BIM deliverables to the GC.
 6. Final BIM deliverables by the GC.
- D. Reporting: The Commissioner shall distribute minutes of the meeting to each party present and to other concerned parties.

PART 3 PRODUCTS

3.01 ACCEPTABLE CONSTRUCTION MODELING FORMATS

- A. All used software for Model authoring and coordination shall be submitted for approval by the Commissioner.
- B. The following software is acceptable for Authoring and Coordination:
- C. Authoring
 1. Architecture Autodesk Revit 2016
 2. Structure Autodesk Revit 2016 Tekla Structures
 3. MEP Discipline Model Autodesk Revit 2016 MEP, Trade 3D CAD per approval
- D. Coordination
 1. Coordination Model Autodesk Navisworks 2016, Autodesk 360 Glue
 2. FM Model Autodesk Revit 2016
 3. As Built Model Autodesk Revit 2016+ Navisworks 2016
- E. Installation & As-Builts
 1. Layout Autodesk Point Layout, Topcon Layout
 2. Facilities Assets Spreadsheet per Commissioner standard

3.02 CONSTRUCTION MODEL REQUIREMENTS

- A. All Construction BIM Models shall be developed to include building systems and components meeting the following requirements:
 1. All Construction Model geometry to fulfill the following LOD standards:
 - a. Architectural LOD 300
 - b. Structural LOD 400
 - c. MEP Systems LOD 400
- B. The Construction Model need to comply with the following criteria:

1. All Models shall use the same Project Origin, Grids and Level naming as the provided Design Intent Model. For Construction Model generated with Revit, the project based coordinate system should be used.
 2. All the subsystems shall be defined either by system type or clearly named layers using an approved Model Color Standard.
 3. All included Modeled geometry for Structure and MEP shall follow the 2013 BIM forum LOD 400 requirement.
 4. Clearance areas required for equipment access shall be modeled as boxes and saved on a distinct, sub-category/layer named clearances.
 5. Any distributed Model files need to be purged and removed external links prior to distribution.
- C. Revit Specific Requirements
1. All Revit based components need to be assigned to the correct CSI Unifomat category.
 2. Function of the component should be assigned (Interior vs exterior doors, walls etc.)
 3. All components should have a specific and clear naming convention. Naming convention need to be submitted as part of the implementation plan.
 4. Columns, walls and other objects should be assigned to correct floor levels since different factors depending on the level might be used during cost estimate.
 5. Columns, walls etc. should not be modeled as one single object across multiple floors. They should be modeled level by level.
 6. Room finishes should be entered to the Model through parameters base finish, ceiling finish, wall finish, floor finish.
 7. All enclosed spaces should for the Architectural Model include rooms.

3.03 AS-BUILT MODEL

- A. The As-Built Model at minimum shall contain the following components and systems of the building reflecting all elements installed or constructed.
1. As-built Models in Revit shall include complete structure per LOD 400, architecture Models to LOD 300. MEP equipment and accessories that require FM attribute will be modeled to LOD 300. The Models will be populated with data using the parameters provided by Commissioner. Any ducts and pipes generated using CAD based authoring software will be linked in as reference to the Revit Model.
 2. All relevant site condition, topography, detailed drainage, storm water (including drainage catch basin manholes and catch basins), sanitary sewers, utilities (including property line box and concrete duct manhole), paving, fencing, and all the intelligence to produce 2D documents and details of features that are on quarter scale drawings.
 3. All the Architectural, Structural, and Civil engineering components of the Model shall have necessary detail to produce accurate plans, elevations, sections, schedules & quantity take-offs.
 4. The As Built Model shall include, fire alarm/mass notification devices, detection systems, all components (i.e. sensors and control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.
 5. The As Built Model shall include all product data, warranties, guarantees, operation manuals, for equipment and materials installed on the job linked to the Model.
- B. The As Built Model shall allow the Commissioner to:
1. Maintain records of maintenance work during the entire life of the facility.
 2. Generate long and short term maintenance schedules.

3. Confirm any potential conflict between electrical, mechanical, HVAC, conveying systems, ducts and conduit provided for use by others, or any other physical elements that cannot be readily managed through the use of two dimensional combined services drawings.
- C. The As Built Model need to be populated during the construction and reviewed monthly for compliance with the established protocols.'

3.04 FINAL DELIVERABLES TO COMMISSIONER:

- A. The GC shall provide three (3) complete printed sets of As-Built drawings derived directly from the As-Built Models to the Commissioner.
 1. All systems that are shown on the as-built drawings should be modeled in the As-Built Models.
- B. The GC shall verify that all Construction Models/As-Built Models (building, structure and building systems) represent to the best of their ability and professional standard of care as-built conditions, including but not necessarily limited to Architectural Supplemental Instructions, Change Notices, Owner defined actual material and manufacturer's information, and any and all field changes.
- C. The As-Built Models will be turned over to the Commissioner within 30 days of construction completion.
- D. The GC shall confirm, and the Commissioner shall upon receipt of the Model verify, that the As-Built Models for each Model/ floor register in X, Y and Z dimensions and coordinates.
- E. The Construction Manager shall deliver to the Commissioner the following after receipt and review of the GC's As-Built Model:
 1. As-Built Models in native format (.rvt). If any ducts and pipes are modeled with CAD they should be linked upon handover. All files must conform to file naming standards established in the BIM Plan.
 2. NavisWorks composite Models of As-Built Models for each floor in .nwd format. All must conform to file naming standards established in the BIM Plan.
 3. Deliver three (3) electronic copies, each on an USB drive with folder structure intact of the As-Built Model.

END OF SECTION

SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY - WASTE MANAGEMENT GOALS

- A. The Owner has established 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, poor 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 shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized
- C. With regard to these goals the Contractor shall develop, for the Owner's Representative's review, a Waste Management Plan for this Project.

1.2 RELATED SECTIONS

- A. Section 01 8113, "SUSTAINABILITY REQUIREMENTS"

1.3 DEFINITIONS

- A. Construction and Demolition Waste: Solid wastes typically includes building materials, packaging, trash, debris, and rubble as they result from construction, remodeling, repair and demolition operations.
- B. Disposal: Removal of off-site waste and subsequent sale, recycling, reuse or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosivity, toxicity or reactivity.
- D. Non-hazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitability, corrosivity, toxicity, or reactivity.
- E. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- F. Recycle: To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.
- G. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of recycling. Recycling does not include burning, incinerating, or thermally destroying waste.
 - 1. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
 - 2. 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.

1.4 PROJECT MEETINGS - CONSTRUCTION WASTE MANAGEMENT MEETINGS

- A. Contractor shall either conduct separate construction waste management meetings or discuss waste management goals and issues as part of the regularly scheduled construction or monthly sustainability review meetings:

1.5 PERFORMANCE REQUIREMENTS

- A. Develop and implement a waste management program resulting in an end-of-project rates for salvage/recycling of minimum 75 percent by weight or volume of the total waste generated by the project.
- B. Regulations: The Contractor shall be responsible for knowing and complying with regulatory requirements -Federal, State, and Local - pertaining to legal disposal of all construction and demolition waste materials.
- C. Coordination: Coordinate the recycling of materials with Owner and Subcontractors as required to conform to the Construction Waste Management Plan.
- D. Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the owner.
- E. Site Access and Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1.6 SUBMITTALS

- A. Draft Waste Management Plan: Within 30 calendar days after receipt of Notice of Award of Bid, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Owner's Representative (1) copies of the Draft Waste Management Plan.
- B. Approved Waste Management Plan: Submit within 10 days after Owner's approval of Draft Waste Management Plan.
- C. Waste Reduction Progress Reports: Concurrent with each application of payment, submit (1) copies of the report in Microsoft Excel format.
- D. Waste Reduction Calculations: Before request for Substantial Completion, submit three (1) copies of calculated end-of-project rates for salvage, recycled, and disposal as a percentage of total waste generated by the work.
- E. Landfill and Incinerator Disposal Records: Submit records indicating receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices. Submit concurrently with waste reduction progress reports.
- F. Donations or Sales: Submit records indicating receipt and acceptance of salvaged waste either donated or sold to individuals and organizations and when it occurs. Indicate whether the organization is tax exempt.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Waste Management Meetings: Conduct on-site waste management meetings with all subcontractors. Review and discuss the waste management plan and each party's roles and responsibilities.

C. Packing and Shipping

1. Shipping: Coordinate the schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
2. Packing: Arrange for the return of packing materials, such as wood pallets, where economically feasible.

D. Handling

1. Provide equipment and personnel to handle products by methods to prevent soiling or damage.
2. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.
3. Promptly return damaged shipments or incorrect orders to manufacturer for credit or refund.

E. Storage

1. Store products in accordance with manufactures recommendations and periodically inspect to assure that stored products are undamaged and are maintained under required conditions.

F. Preparation

1. Storage and Protection: Designate receiving/storage areas for incoming material to be delivered according to installation schedule and to be placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
2. Store and handle materials in a manner as to prevent loss from weather and other damage. Keep materials covered and off the ground, and store in a dry, secure area.
3. Prevent contact with material that may cause corrosion, discoloration, or staining.
4. Protect all materials and installations from damage by the activities of other trades.

G. Waste Management

1. Source separation: Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in order to prevent contamination of materials and to maximize recyclability and salvage ability of identified materials. Waste may be commingled at the site and separated at a recycling facility.
2. Return: Set aside and protect missed-delivered and substandard products and materials and return to supplier for credit.
3. Reuse and Salvage: Set aside, sort, and protect separated products and materials for collection, re-use on site by contractor, and salvage by other.
4. Recycling: Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

PART 2 - PRODUCTS

2.1 WASTE MANAGEMENT PLAN

- A. Draft Waste Management Plan: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Owner's Representative (3) copies of the Waste Management Plan.
1. Develop a waste management plan that results in end-of-Project rates for salvage/recycling of minimum 75 percent by weight or volume of the total waste generated by the work.
 2. Outline the documentation and reporting.
 3. The Draft Plan shall contain the following:
 - a. Analysis of the proposed job site waste to be generated, including types and quantities.

PART 3 - EXECUTION

3.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project.
- B. Distribution: The Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each Subcontractor, the Owner, and the Owner's Representative.
- C. Instruction: The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.
- D. Hazardous wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.
- E. Application for Progress Payments: The Contractor shall submit with each Application for Progress Payment a Summary of Waste Generated by the Project. Failure to submit this information shall render the Application for Payment incomplete and shall delay Progress Payment. The Summary shall be submitted on a form acceptable to the Owner and shall contain the following information:
 - 1. The amount (in tons or cubic yards) of material land filled from the Project, the identity of the landfill, the total amount of tipping fees paid at the landfill, and the total disposal cost. Include manifests, weight tickets, receipt, and invoices.
 - 2. For each material recycled, reused, or salvaged from the Project, the amount (in tons or cubic yards), the date (removed from the jobsite, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling each material. Attach manifests, weight tickets, receipts, and invoices.

3.2 TRANSPORTATION

- A. Transport materials in covered trucks to prevent contamination of product or littering of surrounding areas.

3.3 INSTALLATION

- A. Install product(s) per manufacturer's recommendations to reduce damage to or waste of materials by required replacement.

3.4 PROTECTION

- A. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed. Save plastic covering. At completion of Project, reuse if practical; if not, then recycle.

3.5 CLEANING

- A. Control accumulation of waste materials and trash. Recycle or dispose of off-site at intervals approved by the Owner and in compliance with waste management procedures.
- B. Cleaning materials: Use cleaning materials that are non-hazardous.

3.6 FINAL CLEANING

- A. Cleaning Materials: Only non-hazardous cleaning materials shall be used in the final cleanup.
- B. Recycle, salvage, and return construction and demolition waste from Project.
- C. Arrange for pick-up of salvageable materials in accordance with the Waste Management Plan.

END OF SECTION

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SECTION 01 8113 - SUSTAINABILITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

- A. General Requirements
- B. This Section Includes
1. Definitions
 2. Material Submittals - Sustainable
 3. Submittal Requirements
 4. Action Plans

1.3 RELATED REQUIREMENTS

- A. Section 01 7419 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
- B. Section 01 8119 INDOOR AIR QUALITY REQUIREMENTS
- C. Section 01 9113 GENERAL COMMISSIONING REQUIREMENTS

1.4 DEFINITIONS

- A. New York City Environmentally Preferable Purchasing (EPP) Minimum Standards for Construction Products, [www. http://www.nyc.gov/html/mocs/html/programs/epp.shtml](http://www.nyc.gov/html/mocs/html/programs/epp.shtml).
- B. United States Department of Energy: ENERGY STAR program.
- C. American Society for Testing and Materials test Method D 5116 (Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products).
- D. New York Codes, Rules, and Regulations: Part 205 of Title Six of the standard.
- E. Luminaire Efficacy Rate (LER): Describes the efficiency of a luminaire in terms of rated light output (in lumens) per watt of electricity use. Lumen is a measure of light output.
- F. Ballast Efficacy Factor (BEF): The ratio of the ballast factor (BF) to input watts.
- G. Postconsumer Recovered Material: A material or finished product that has served its intended use and has been diverted or recovered from waste destined for disposal, having completed its life as a consumer item.
- H. Recovered Material: Waste materials and byproducts which have been recovered or diverted from solid waste, but such term does not include those materials and byproducts generated from and commonly reused within, an original manufacturing process.
- I. Basic Oxygen Furnace (BOF): Materials made of steel from the BOF process containing 25-30% total recovered materials (Steel), of which 16% is post-consumer material (steel).
- J. Electric Arc Furnace (EAF): Materials made of steel from the EAF process containing 100% recovered material (Steel), of which 67% is post-consumer material (steel).

- K. Post-Consumer Material: Waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the material or product, which can no longer be used for its originally intended purpose.
- L. Volatile Organic Compound (VOC): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate, which participates in atmospheric photochemical reactions, as specified in part 51.00 of chapter 40 of the United States code of federal regulations.
- M. Non-pressure Pipe: Pipe used for drainage and as a conduit in construction for non-pressurized materials.
- N. Green Label Plus Program: The Green Label Plus program for carpets and its associated VOC emission criteria in micrograms per square meter per hour, along with information on testing method and sample collection developed by the Carpet and Rug Institute (CRI) in coordination with California's Sustainable building Task Force and the California Department of Public Health, are described in Section 9, Acceptable Emissions Testing for Carpet, DHS Standard Practice CA/DHS/EHLB/R-174, dated 07/15/04.

1.5 GENERAL SUBMITTALS

- A. All sustainability performance verification submittals are in addition to other submittal requirements. If a submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated Sustainable Design requirements.

1.6 ACTION SUBMITTALS

- A. Sustainability performance verification submittals: Product data certification letters and other documentation needed to show compliance with requirements.
- B. Sustainability Submittal Requirements
 - 1. For each product in the submittal include, as required, the following items:
 - a. Manufacturer's product data
 - b. Product certification information
 - c. Material Safety Data Sheets (MSDS), if require
 - 2. For all adhesives, sealants, paints, and coatings: a copy of the manufacturers' MSDS with the VOC content level (g/L) highlighted.
 - 3. For all materials with a sustainability performance requirement, provide a copy of the manufacturer's product data sheet with the requirements highlighted.
 - 4. For all Carpet Systems: provide a copy of the manufacturers' documentation of compliance with the GREEN LABEL PLUS program.
 - 5. For all composite wood products: provide a copy of the manufacturers' statement highlighting that the product does not contain added urea-formaldehyde.
 - 6. For all domestic plumbing fixtures, provide the manufacturers' cut sheet with the flush/flow rates highlighted.

1.7 INFORMATIONAL SUBMITTALS

- A. Construction IAQ Management, During Construction
 - 1. A signed copy of the Construction Indoor Air Quality Management Plan printed on the general contractor's letterhead.
 - 2. Product cut sheets for each temporary filtration media used during construction, include manufacturers' name, model number and MERV rating.
 - 3. Photographs documenting compliance, as outlined in Section 01 81 14, paragraph 2.3, B
 - 4. A copy of the project's Indoor Air Quality Management activities log.

- B. Construction Waste Management
 - 1. A signed copy of the Construction Waste Management Plan printed on the General Contractor's letterhead.
 - 2. Final Construction Waste Management Log
 - 3. Letter(s) from the Waste Hauler(s) indicating the summary of the amounts and percentages of materials diverted from landfill.

1.8 CORRDINATION OF SUBMITTALS

- A. Coordination of Submittals: Coordinate compliance submittals with general submittals requirements outlined in DDC General Conditions.
- B. The General Contractor is responsible for assembling all submittals of materials and work required, as outlined in this specification.
- C. Sustainable Design submittal requirements are in addition to other product submittal requirements specified in the construction documents.
- D. If a submittal is rejected or required to be resubmitted per the Design Team's review, the contractor is to provide one (1) copy of the resubmitted compliance information as required.
- E. The General Contractor is required to answer questions as they relate to materials, suppliers, and product installation.

PART 2 - PRODUCTS

2.1 RECOVERED POST-CONSUMER CONTENT

- A. Provide building materials with recovered post-consumer content as required by the New York City Environmentally Preferable Purchasing Program.
- B. Recovered post-consumer content material requirements, (minimum performance percentages), are listed within each individual product section.

2.2 TOTAL RECOVERED MATERIAL CONTENT

- A. Provide building materials with recovered content as required by the New York City Environmentally Preferable Purchasing Program.
- B. Recovered post-consumer content material requirements, (minimum performance percentages), are listed within each individual product section.

2.3 CARPET SYSTEMS

- A. All carpet systems installed in the building are to meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program. All carpet cushion installed in the building is to meet the requirements of the Carpet and Rug Institute Green Label program. All carpet adhesives are required to meet the requirements of the SCAQMD Rule #1168.

2.4 AIR FILTRATION MEDIA

- A. Install the base building ventilation systems with an air filtration media with a Minimum Efficiency Reporting Value (MERV) of 13 or better.
- B. If the permanent installed ventilation systems are used during construction, the units must have a minimum MERV filter rating of 8 or higher.

2.5 REFRIGERANTS

- A. Provide systems that contain no CFC based refrigerants.

2.6 DOMESTIC PLUMBING FIXTURES

- A. Install domestic plumbing fixtures that at a minimum meet the minimum fixture flow rates as requirement by the New York City Environmentally Preferable Purchasing Program requirements, section 7 - Plumbing fixtures.

2.7 LIGHTING FIXTURES - FIXTURES AND LAMPS

- A. Select and install luminaires (light fixtures) with Luminaire Efficacy Rating in compliance with the New York City Environmentally Preferable Purchasing Program requirements, section 5 - Lighting Products.
- B. Select fixture components (Ballasts and Lamps) in New York City Environmentally Preferable Purchasing Program requirements, section 5 - Lighting Products.

2.8 ENERGY STAR EQUIPMENT AND APPLIANCES

- A. Install only Energy Star certified appliances eligible products installed in the project within the General Contractor's scope of work.

2.9 ROOFING SYSTEMS

- A. Install an Energy Star certified high albedo roofing surface for all roof systems.
- B. Select system components that comply with the New York City Environmentally Preferable Purchasing Program requirements, section 6.30 - Roof Products.

2.10 COMPOSITE BASED WOOD PRODUCTS - NO ADDED UREA-FORMALDEHYDE

- A. All interior composite wood and agrifiber products are to contain no added formaldehyde.
- B. All adhesive and resin products, used on-site and factory applied are to be formaldehyde free.

2.11 LOW-EMITTING MATERIALS

- A. All interior applied adhesives, sealants, paints, coatings, are to be tested and determined compliant in accordance with New York City Environmentally Preferable Purchasing Program requirements for minimum VOC limits, section 2- Architectural Coatings.
- B. All minimum VOC product limit are listed within each product section.

PART 3 - EXECUTION

3.1 MEETINGS AND PROGRESS REPORTING

- A. The General Contractor is required to attend each month a one hour sustainability project progress meeting.
- B. Meeting schedule, times, and dates will be agreed upon at the beginning of construction.
- C. Prior to each meeting, the General Contractor is to provide the following items electronically to the Project LEED Consultant:

1. Construction Waste Management progress reports.
2. Indoor Air Quality Management log and photographs documenting compliance.
3. An updated project submittal log indicating the status of all material submittals.

3.2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

- A. All Contractors are to comply with the Construction Indoor Air Quality Management requirements and practices outlined in Section 01 8114, "Indoor Air Quality Requirements."

3.3 CONSTRUCTION WASTE MANAGEMENT

- A. All Contractors are to comply with the construction waste management practices and requirements outlined in Section 01 7419, "Construction Waste Management and Disposal."

END OF SECTION

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SECTION 01 8114 - INDOOR AIR QUALITY REQUIREMENTS

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. The project includes general requirements and procedures for the Contractor for maintaining and controlling indoor air quality during construction:
 - 1. The responsible Contractor is to adopt a construction indoor air quality management (IAQ) program and plan for the construction and pre-occupancy phases of the buildings. The plan is to conform to the SMACNA IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2007, AMSI/SMACNA 008-2008 (Chapter 3).
 - 2. The responsible Contractor is to maintain project IAQ logs that include the reporting and issues related to the Indoor Air Quality Management during the construction process.
 - 3. Project Indoor Air Quality Management meetings.

1.2 RELATED SECTIONS

- A. Section 01 81 13 - SUSTAINABLE REQUIREMENTS

1.3 INFORMATION SUBMITTALS

- A. Submission requirements
 - 1. Construction IAQ management "During Construction".
 - a. Construction Indoor Air Quality Management Plan.
 - b. Product cut sheet for each temporary filtration media used during occupancy, include manufacturer's name, model number and MERV value.
 - c. Product cut sheet for filtration media used during occupancy, include manufacturer's name, model number and MERV value.
 - d. Construction Documentation: A minimum of 6 digital photographs at three different occasions (minimum total 18 photographs) during construction along with brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials. Each photo is to be date and time stamped.
 - e. A copy of the Indoor Air Quality Management Activities Log.
- B. Meetings and Progress Reports
 - 1. Prior to each meeting, the responsible contractor will provide the following items electronically to the Project Architect.
 - a. IAQ Management progress reports.
 - b. Photos of IAQ Management procedures implemented.

1.4 QUALITY ASSURANCE

- A. Subcontractors and their employees shall be provided instruction and training by the Contractor as defined in the IAQ Management Plan.
- B. The IAQ Management Plan shall highlight the requirements of the Sheet Metal and Air Conditioning National Design/Builders Association SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter3) and shall include the principles and practices set forth in this Section.

1.5 INDOOR AIR QUALITY MANAGEMENT PLAN

The responsible contractor is to develop an indoor air quality management plan for the construction and pre-occupancy phases during construction which complies with SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter3). The IAQ plan should address all the measures including HVAC Protection, Source Control, Pathway Interruption, Housekeeping and Scheduling. Provide at least 18 photographs taken during the construction process that document the each of the SMACNA measures being carried out. Create and implement an activity log to track the actions following the indoor air quality management plan.

A. HVAC Protection

- 1. Store HVAC equipment in a clean, dry location. Until HVAC equipment (ducting, registers, air handler components, fans, and motors) has been installed, it shall be kept covered with plastic film or in a location where it will not be exposed to moisture, dust, or other contaminants.
- 2. Seal all HVAC inlets and outlets. Use of the HVAC system shall be avoided during construction until drywall construction is complete. Temporary ventilation may be installed to remove contaminants. All air inlets and outlets shall be sealed during construction. These include outside air inlets, grilles, diffusers, supply ducts, return ducts, ceiling plenums, VAV (variable-air volume) plenum intakes, and window ventilator or air conditioning units. Openings shall be sealed with plastic film and tape that can be removed cleanly.
- 3. Seal HVAC components during installation. For ducting runs that require several days to install, sections shall be sealed off as they are completed. Seals shall be removed prior to continuing the ducting run. Other components of the HVAC system shall be subjected to the same requirements to protect them from contamination.
- 4. Use temporary filtration media. If the HVAC system is to be used while construction work is being done, temporary filtration media shall be installed at each return grill. Such filtration media shall have minimum filtration efficiency (Minimum Efficiency Reporting Value-MERV per ASHRAE 52.2) of 8. After Substantial Completion install new filtration with a MERV rating of 8 in areas of the work where dust producing activities are generated.
- 5. Inspect filters regularly. When the HVAC system is being used during construction and temporary filters are installed, filters shall be inspected weekly and replaced as needed.
- 6. When outdoor construction activities generate dust, combustion emissions, or other contaminants, operable windows and outside air supplies to enclosed portions of the building shall be protected in a manner that prevent contaminants from entering the building without harming the equipment.

B. Source Control

- 1. Protect against moisture exposure. Building materials should be kept dry with special care taken with materials susceptible to the growth of mold and bacteria such as wood, porous insulation, paper, and fabric. Schedule deliveries so that materials that are susceptible to mold growth are installed after the enclosure is watertight. Cover building materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials.
- 2. Water damaged materials should be dried within 24 hours. Due to the possibility of mold and bacterial growth, materials that are damp or wet for more than 24 hours may need to be discarded. Immediately remove materials showing signs of mold and mildew, including any with moisture

stains, from the site and properly dispose of them. Replace moldy materials with new, undamaged materials.

3. In the event of rain or groundwater gaining entry to the building interior during construction, notify the Owner's Representative.
4. Avoid tracking pollutants into work areas.
 - a. Control access to the building interior to minimize the tracking in of contaminants.
 - b. Provide temporary entryway surfaces designed to remove moisture and contaminants from workers shoes.
 - c. Prevent the ingress of rodents and pests.
 - d. Do not permit smoking inside the building or on the project site.

C. Pathway Interruption

1. Incorporate contaminant pathway interruption methods in the Indoor Air Quality Management Plan. Methods of pathway interruption detailed in the SMACNA IAQ Guidelines for Occupied Buildings include:
 - a. Depressurize the work area while maintaining the required filtering and rate.
 - b. Pressurize adjacent occupied space. Including temporary rebalancing. Ensure that the HVAC system remains protected from construction emissions.
 - c. Erect barriers to contain construction area.
 - d. Locate pollutant sources away from critical air flow pathways.
 - e. Temporarily seal the building. Where construction emissions are occurring on the roof or adjacent to other buildings, contaminants may be drawn in through cracks in the outside air intake if the building is under negative pressure or other entries.

D. Housekeeping

1. Minimize accumulation of dust and other contaminants. Construction practices shall be used that minimize the production of dust and other contaminants from construction activities. Use integral dust-collection systems on machinery that generates dust. Where possible, confine dust-generation activities to areas where clean-up can be carried out easily and contaminants will not be tracked to other areas.
2. Suppress Dirt. Wetting agents or sweeping compounds shall be used to keep dust from becoming airborne. Use other methods if wetting will harm surfaces being protected.
3. Clean up dust. Cleaning frequency shall be increased when dust accumulation is noted. Use equipment designed to retain dust within the cleanup media.
4. Clean up spills. All spills and excess applications of solvent-containing products should be cleaned up using approved methods as soon as practicable. Water spills shall be mopped up promptly.
5. Keep work area dry. The entire area shall be kept as dry as practicable by promptly repairing any leaks that allow rainwater entry and mopping up any water accumulation. Use dehumidification if necessary for prompt drying of wetted spaces.
6. Un-vented combustion (e.g., propane or diesel "salamander" space heaters) shall not be used.
7. Seal containers containing volatile liquids. Containers of fuel, paints, finishes, and solvents shall be kept tightly sealed and preferably stored outside of the building when not in use.

E. Sequencing and Scheduling

1. Schedule the installation of porous materials only after closing in building. Porous materials, such as insulation, fireproofing, and drywall shall not be installed in a building until the envelope is fully water tight.
2. Furnishing shall not be installed until interior finishes (paints, stains and sealants) have been applied and have fully cured.
3. Provide adequate ventilation during curing period. To aid in curing of interior finishes and other products used during construction and to remove pollutants after drywall installation is complete, provide adequate ventilation with 100% outside air, and proper filtration. In humid periods or when very high-moisture materials are present, supplementary dehumidification may be required during this curing period.

PART 2 - PRODUCTS

2.1 INDOOR AIR QUALITY MANAGEMENT PLAN

- A. Develop an Indoor Air Quality Management Plan within 10 calendar days after receipt of the Notice of Award of Bid, or prior to the arrival of materials onsite, whichever occurs sooner, the Contractor is to submit to the Owner's Representative two (2) copies of the Plan.
 - 1. Plan is to include all required measure outlined in this section.
 - 2. Plan is to include an outline of the documentation and end of project reporting deliverables.

2.2 FILTRATION MEDIA

- A. During Construction
 - 1. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period, filtration media should meet the requirements outlined in paragraph 1.5,A, 4 of this section
- B. Prior to Occupancy
 - 1. Replace all air filters prior to occupancy. Filtration media with a minimum MERV 8 is to be installed in all central unitary air handlers and air conditioning equipment prior to any portion of the building being occupied.

PART 3 - EXECUTION

3.1 INDOOR AIR QUALITY MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: The Contractor is to designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting results of the Indoor Air Quality Management Plan.
- B. Distribution: The Contractor is to distribute copies of the Indoor Air Quality Management Plan to the Job Site Foreman, each Subcontractor, the Owner, and Owner's Representative.
- C. Indoor Air Quality Management Kickoff Meeting: The Contractor and required Subcontractors are required to attend and Indoor Air Quality Management kickoff meeting to review and discuss the plan and compliance approaches.
- D. Instruction: The Contractor is to provide on-site instruction of appropriate methods to be used by all parties at the appropriate stages of the Project.
- E. Implementation: Implement and document the approved Indoor Air Quality Management Plan during the construction and pre-occupancy phases of the project.
- F. Application for Payment: With each Application for Progress Payment, the Contractor is to submit a summary of IAQ Management activities. The summary is to be submitted on a form acceptable to the Owner.

END OF SECTION

SECTION 01 9113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1

1.1 RELATED DOCUMENTS

- A. All of the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.
- B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
 1. Section 01 0000 - General Requirements
 2. Section 01 5000 - Temporary Facilities and Controls
 3. Section 01 7700 - Closeout Procedure
 5. Section 21 0000 - Fire Protection
 6. Section 22 0000 - Plumbing
 7. Section 23 0000 - Heating, Ventilating, and Air Conditioning
 8. Section 26 0000 - Electrical
 9. Section 27 0000 - Technology
 10. Section 27 0100 - Communications Systems

1.2 DEFINITIONS

- A. Abbreviations: The following are the most-common abbreviations used in Specifications and in the Commissioning process.

PC	Plumbing Subcontractor	CC	Controls Subcontractor
MC	Mechanical Subcontractor	CT	Combined Test (pre-functional and functional)
A/E	Architect and design engineers	FT	Functional performance test
CA	Commissioning Agent	GC	General Contractor (prime)
ATC	Automatic Temperature Controls contractor (also referred to as Building Automation System (BAS) subcontractor)	HS	HVAC Subcontractor
PS	Plumbing Subcontractor	FP	Fire Protection Subcontractor
OPM	Owners Project Manager (a.k.a. the Owner's Project representative)	PT	Pre-functional checklist
Cx	Commissioning	Sub	Subcontractors to General Contractor (includes sub-
EC	Electrical Subcontractor	TAB	Testing, Adjusting and balancing Sub-subcontractor
DI	Design Intent	OPR	Owners Project Requirements
BOD	Basis of Design	BAS	Building Automation System

1. Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.
2. Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.
3. Architect/Engineer (A/E) - the prime consultant (architect) and sub-consultants who

- comprise the design team, generally the HVAC mechanical designer/engineer, the electrical designer/engineer, and the plumbing/fire protection designer/engineer.
4. Basis of Design (BoD) - the basis of design is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The basis of design describes the systems, components, conditions and methods chosen to meet the intent.
 5. Certified Testing Company - an industry certified company utilizing industry certified technicians on this Project who will perform inspections and testing for equipment and systems. This company is not affiliated or owned by the equipment manufacturer
 6. Commissioning (Cx) - Commissioning is a systematic process of ensuring that all building systems are designed, installed, and performing interactively according to the design and the Owner's operational need, and that the Owner's staff resources are adequately trained in the operation of this equipment. The Cx shall be achieved by enforcing quality, improving communications and documentation beginning in the design phase, and continuing through construction, testing and start-up, acceptance and the warranty period. As part of their Project responsibilities, respective Contractors shall document what has been provided and installed, and verify the performance of their Work as individual components and as part of integrated systems, and provide a high level of training for the Owner's staff. The Commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors to provide a finished and fully functioning product.
 7. Commissioning Authority (CA) - The CA directs and coordinates the day-to-day Commissioning activities. The CA reports to the Owner's Project Manager.
 8. Contract Documents - the documents binding on parties involved in the construction of this Project (including but not limited to: drawings, specifications, change orders, amendments, and contracts).
 9. Contractor - the General Contractor or authorized representative.
 10. Control System - the central building energy management control system, also called the building automation system (BAS), which includes the automatic temperature controls.
 11. Data Logging - monitoring flows, currents, status, pressures, etc. of equipment using standalone data loggers separate from the control system.
 12. Deferred Functional Tests (DFT) - Functional Tests that are performed later, after Substantial Completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed during the normal acceptance phase with other systems. The determinations of which system are allowed DFT are determined by and at the discretion of the CA.
 13. Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).
 14. Design Criteria - specific criteria provided by the design team relating to performance which must be met by the work of the contractors.
 15. Design Intent - a dynamic document that provides the explanation of the ideas, concepts and criteria that are considered to be very important to the Owner. It is initially the outcome of the programming and conceptual design phases.
 16. Design Narrative or Design Documentation - Sections of either the Design Intent or Basis of Design
 17. Functional Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure set point). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. The

Commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is performed by the installing Contractor or vendor. FTs are performed after pre-functional checklists startup is complete.

18. General Contractor (GC) - the prime Contractor for this Project. Generally refers to all the GC's subcontractors as well. The GC is also referred to as the Contractor, in some contexts.
19. Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
20. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
21. Manufacturer's Service Representative (MSR) - A company that is certified and trained by a manufacturer to provide startup, testing, and troubleshooting service for equipment. Also named manufacturer's representative.
22. Manufacturer's Representative Startup Testing - testing of equipment on-site or at the factory by factory trained personnel. This is part of pre-functional testing.
23. Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
24. NETA - National Electrical Testing Association, Inc.
25. Non-Compliance - see Deficiency.
26. Non-Conformance - see Deficiency.
27. Overwritten Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation).
28. Owner's Representative (OR) - a) the Owner's representative in the day-to-day activities of construction. In general, the (OR) is hired by the Owner to assist in the overall management of the Project. Also may be referred to as the Owner's Project Manager (OPM) and/or the Owner's Project Representative (OPR).
29. Phased Commissioning - Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.
30. Owner-Contracted Tests - tests paid for by the Owner outside the GC's contract. These tests will not be repeated during functional testing if properly documented.
31. Owner Objectives - A distillation of the most salient concepts within the Owner's Project Requirements considered important to the owner to have in writing and to be tracked through design and construction. The owner Objectives are sometimes referred to as the design intent
32. Owner's Project Manager (OPM) - the Owner's representative in the day-to-day activities of construction. In general, the (OPM) is hired by the owner to assist in the overall management of the Project. Also may be referred to as the Owner's Representative (OR).
33. Owner Project Requirements (OPR) - documentation of the functional requirements of the facility and the expectations of how it will be used and operated. This includes Project and design goals, measurable performance criteria, budgets and schedules and supporting information. This document is analogous to what has traditionally been referred to as the owner Program
34. Phased Commissioning - commissioning that is completed in phases for specific portions of the work (by floors or areas, for example) due to the size of the structure or other scheduling issues.
35. Pre-Functional Checklist (PFC) - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, by the Sub. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as

measuring the voltage imbalance on a three phase pump motor of a chiller system). The word pre-functional refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer's start-up checklist. The purpose of pre-functional testing is to confirm and record what has actually been installed, and to assure that individual components are installed properly and completely and are ready to be operated safely.

1.3 COMMISSIONING TEAM RESPONSIBILITIES

- A. General Descriptions of Cx Responsibilities: General descriptions of the Commissioning team roles and responsibilities are as follows. All Cx team members shall attend Cx related meetings when requested. Specific team member roles are described in greater detail in later Sections of this Commissioning Specification.
1. Commissioning Authority (CA): Develops and facilitates the Cx process, participates in creating tests, witnesses and/or verifies certain testing of installed systems and approves or rejects performance test results. The CA compiles a final Cx report, assists in organizing and conducting the Owners training and provide system evaluation at a date to be determined.
 2. General Contractor (GC): Directs the subcontractor's implementation of the Cx process, integrates tests and commissioning milestones into the project timeline. Holds subcontractors responsible for completing and commissioning their work. The GC reviews and approves test plans and signs-off on the validity of the tests and performance results as documented by subcontractors prior to requesting the owner and/or commissioning agent approval or requesting payment for such work. The GC coordinates subcontractors commissioning efforts, planning and causing the work to the general construction and subcontractors to be complete early enough in the project schedule such that Cx can occur prior to occupancy. As the project progresses the General Contractor shall keep and compile all Cx related documents submitted/corresponded by contractors throughout the entire project period, and provide five organized electronic copies and five printed record sets to the Owners Project Manager at the end of the project. The General Contractor shall work with the CA to plan the owners training and shall cause subcontractors to prepare and conduct training.
 3. Contractors and Subcontractors: Document what has actually been installed as Work of this Project. Provide installation and start-up manuals, operations and maintenance manuals, and warranties. Demonstrate proper system performance. For each Portion of the Work, as well as for final integrated system-wide acceptance prior to completion of each Phase of Work, commission their Work and perform pre-functional inspection and functional tests. Participate in training. Assist other Contractors in completing their portion of related Work such that the integrated systems can be commissioned. Subcontractors and Contractors shall be responsible for correcting all deficiencies identified during start-up and commissioning as well as retesting in order to confirm corrective actions effectiveness. Arrange for manufacturer's representative start-up or all major equipment and for their participation in Owner training.
 4. Architects and Engineers: Develop Commissioning specifications for their respective trades including tests. Perform construction observation, answer requests for information, produce construction punch lists, issue addendums, review submittals, and O&M manuals, and assist in resolving problems. Participate in training, providing overall system design intent, and integration description.
 5. Owner's Project Manager: Facilitates and supports the Cx process, enforces Contract requirements, and authorizes Contractor payments.
 6. Manufacturers' Representatives: The equipment manufacturers and vendors shall provide installation and start-up instructions, as well as operations and maintenance manuals and staffing with expertise to facilitate the Commissioning Work and perform Contracted startup services. Participate in training.

7. Owner's O&M Personnel: Participate in Cx meetings and witness functional testing. Participate in training as appropriate.

- B. The Contractors retain their full Contract Document responsibilities in providing a finished and fully-functional facility. Commissioning does not reduce these responsibilities. Contractors are responsible for their Work and materials until the Commissioning is complete and final acceptance by the Owner has occurred and until such responsibilities as described in the Contract Documents have been fulfilled, including seasonal testing and warranty period services.
- C. Roles and responsibilities defined in this Section relate to the Commissioning process and do not diminish other requirements. The specification herein shall be considered in addition to, not in lieu of, other Contract requirements. Where requirements herein conflict with other Sections of the specifications, consult the Architect for clarification prior to proceeding.
- D. All guarantees and warranties shall not begin until final acceptance of the systems and equipment by the Owner. Final acceptance requires, at a minimum, systems commissioning completion including all Cx related documentation and Owner training.
- E. Commissioning requires active Project team involvement and participation to deliver effective and successful results.
- F. Completion and approval of Commissioning shall be accomplished as a prerequisite for Substantial Completion and Substantial Completion shall be a prerequisite for final acceptance of the Project by the Owner.
- G. The Commissioning Authority (CA) is a consultant hired by the Fire Department of the City of New York (FDNY) to oversee quality control and continuity of the Project from design to the final installed and commissioned construction product, as well as to improve documentation and training. The CA acts solely on behalf of the FDNY.
- H. The CA communicates with the Owner and/or Owner's Project Manager regarding acceptable or unacceptable conditions. The Owner will have the final decision, if necessary, how to proceed with each action item (issue, RFI, or deficiency) and whether to accept the design team and/or Contractors resolution.

1.4 COMMISSIONING SCOPE

- A. The systems listed below shall be commissioned. All systems below shall receive the pre-functional and functional testing - no sampling will be accepted. All testing is at a minimum and is superseded by Code requirements, if applicable. Individual system testing requirements are included in Sections 4 - 7 of this Specification [4. Mechanical, 5. ATC, 6. Plumbing & Fire Protection, 7. Electrical]. The GC shall review all Commissioning responsibilities of each subcontractor and confirm each subcontractor is aware of their responsibilities and has carried all costs of Commissioning in the base bid.

Systems/Equipment to be Commissioned	Minimum Sample for Functional Testing by Contractor (%)
HVAC Systems	100
Boilers	100
Chillers	100
Domestic hot water heating coils	100

Piping	100
Heat exchangers	100
Pumps and drives	100
Air handler systems	100
Rooftop units	100
Heating and ventilating units	100
Unit ventilators	100
Cabinet unit heaters	100
Fan coil units	100
Unit heaters	100
Finned tube radiation	100
Convectors	100
Exhaust fans	100
Combustion air units	100
Split system AC	100
Make-up air units	100
Fume hoods	100
Heat recovery systems	100
Testing, adjusting, and balancing	100
Automated temperature controls and energy management systems	100
Plumbing Systems	100
Natural gas systems	100
Compressed air systems	100
Backflow preventers	100
Pressure booster systems	100
Water heaters	100
Hot water storage	100
Recirculation pumps	100
Water closets and sinks	100
Laboratory waste and acid neutralization systems	100
Safety shower/eyewash stations	100

Mixing valves	100
Irrigation Systems	100
Electrical Power Systems	100
Electrical service and switchgear	100
Transformers	100
Motor control centers	100
Electrical distribution systems	100
Emergency and standby power systems including automatic transfer switching systems	100
Lighting and lighting control systems	100
Low voltage systems	100
Grounding and bonding systems	100
Interfaces to automated temperature/building automation control systems	100
Life Safety Systems	100
Fire alarm systems	100
Fire suppression systems	100
Fire pump systems	100
Egress lighting	100
Egress pressurization systems	100
Interface of these systems with HVAC systems, fire alarm and security systems	100

1.5 COMMISSIONING PROCESS OVERVIEW

A. General Process Narrative

1. Commissioning during construction begins with a kickoff meeting conducted by the CA wherein the Commissioning process is reviewed with the Commissioning team members.
2. Commissioning meetings requested by the CA and/or GC will be required throughout construction, to plan, scope, coordinate, and schedule future activities and resolve problems. The CA attends regular construction meetings as necessary to address equipment installation & startup issues.
3. Equipment Documentation is submitted to the Engineer during normal submittals, including detailed start-up procedures. The GC will provide a copy to the CA after the Engineer has reviewed and commented for all equipment that is to be commissioned. The CA will review and comment on the submittals.
4. After submittals have been approved, the subcontractors shall supply additional information regarding manufacturer's installation, start-up, and test procedures within 60 days of receiving approved submittals to the CA for use in finalizing pre-functional

- checkouts and functional tests.
5. The CA and design team develops drafts of equipment and system functional performance test procedures. The Subcontractors review the procedures and provide comments. The Subcontractors develop startup plans and provide to the GC who will forward to the CA. The GC will incorporate the subcontractors' expected start-up schedules into the master project construction schedule and forward these to the CA. The start-up procedures precede functional testing.
 6. Considering the actual sequence of construction, the Subcontractors perform initial checkout and startup. Subcontractors shall execute and document the pre-functional checklists in addition to those provided by the manufacturer's representative. The CA shall be notified reasonably in advance of and have the opportunity to witness start-up and pre-functional tests of major equipment.
 7. If this project involves several phases of work and/or portions of work within each phase, and Cx shall occur at the completion of each phase and/or portion of work prior to occupancy and then again at the end of the project as an integrated final Cx process.
 8. Contractors shall provide O&M manuals which shall be reviewed by the CA. The Contractors shall update and reissue the manuals as needed.
 9. Once the start-ups and pre-functional tests are complete subcontractors shall correct deficiencies. After the pre-functional tests are approved by the CA, the subcontractors and GC shall schedule the functional tests. The functional testing shall be scheduled at least two weeks in advance. The functional test procedures are executed and results are documented by the Subcontractors. The CA may witness certain tests, requests retesting to verify the results which they were unable to witness, or otherwise verifies the subcontractors documented results. The subcontractor conducts retesting for verification purposes at the request of the CA as part of their base contract.
 10. Items of non-compliance in material, installation or start-up are corrected at the subcontractor's expense and the system(s) retested. In the event that the subcontractor schedules or reports results of tests and there are deficiencies which require retesting, the subcontractor shall pay for the time and expenses of the CA to witness or re-verify test results.
 11. The ATC contractor shall provide point to point check outs, functional testing and initial acceptance trend logs.
 12. The TAB contractor provides a TAB plan, assists the mechanical and controls contractor with calibration and submits preliminary and final testing results. If this Project involves several phases, and TAB shall occur at the completion of each phase, and then again at the end of the Project as an integrated final TAB process. The TAB contractor shall be available at no additional cost to the Owner to participate in retesting after startup and Cx deficiencies have been corrected. The TAB contractor shall conduct training for the Owner in the intent of the fluid flows in the building and operating practices.
 13. The GC and subcontractors provide all as-builts, maintenance requirements and on-going commissioning recommendations to the CA for incorporation into the systems manual.
 14. The GC and subcontractors provide a training plan and proposed materials at least 30 days prior to scheduled training. The CA reviews and comments on the Contractors training materials that in turn modify the plan and materials as appropriate.
 15. The CA shall prepare a project manual which includes all relevant commissioning related correspondence generated throughout the Project. The GC and Subcontractors shall support the CA in obtaining this information by providing supplemental information as requested by the CA.
 16. The CA shall develop a project manual which will include O&M manuals, sequences of operations, design data, maintenances requirements and frequency of maintenance. The GC and subcontractors shall support the CA in developing this manual by providing detailed maintenance requirements and maintenance schedules for all commissioned systems. This data shall include a summary level matrix of all maintenance activities, including materials to be used, and the frequency of scheduled maintenance.
 17. The GC shall organize an electronic equipment inventory and database, including planned maintenance activities and populate the Owners computerized maintenance

management system software application with this data.

18. The CA recommends the acceptance of substantial completion and Cx results to the Owner when commissioning has been satisfactorily completed.
19. Near-warranty-end and post occupancy review will be performed by the CA approximately 10 months after the beginning of the warranty period. The GC and respective subcontractors will be required to demonstrate the operation of equipment/systems that were not tested under all conditions and/or had open issues or unresolved deficiencies or have seasonal testing requirements.
20. Subcontractors provide service during warranty as specified in contract documents.

B. Seasonal Commissioning Tests

1. Commissioning includes seasonal testing of HVAC systems in three seasons: summer, spring or fall, and winter.
2. For winter installation, the Contractors must return in the summer to functionally test and ensure mechanical systems operate as designed under hot and humid conditions. Such examples may include inspection for coil moisture carryover, proper system cooling ability, etc.
3. For summer installation the Contractor must return in the winter to check heating system and humidification systems.
4. Contractors must return in either the spring or fall to commission and check seasonal system change over and economizer operation.

C. Commissioning Closeout

1. All TAB and Commissioning activities must be complete prior to Commissioning Substantial Completion, unless approved in writing by the Owner. Exceptions to this are the planned control system training performed after occupancy and any required seasonal or approved deferred testing. This includes for all systems, but is not limited to:
 - a. Completed and signed start-up and pre-functional checklist documentation
 - b. Approval of BAS trend log data, successful integrated systems operation, point to point controls checkout, controls as-built records, and approved software.
 - c. Submission of final TAB report; approved by CA.
 - d. Completion of all functional testing and its documentation; approved by CA.
 - e. All identified deficiencies have been corrected or are approved by the Owner.
 - f. Receipt of all required as-built and Project record documentation.
 - g. Fulfillment of Owner's training.
2. The Owner will determine the date of Project Substantial and Final Completion after reviewing the CA's recommendation for such acceptance. This project is phased, with various portions of work within each phase. The Cx process shall incorporate the understanding of systems that are partially commissioned to allow occupancy in specific areas, however shall be recommissioned upon completion of the entire system.
3. Completion of Commissioning is a condition of final payment as defined in the Contract Closeout Sections of this Contract.
4. Commissioning activities are non-compensable and cannot be a cause for delay claims.

1.6 GENERAL CONTRACTOR'S RESPONSIBILITIES

A. The General Contractor shall have the following responsibilities related to Commissioning:

1. General Items

- a. Overall scheduling, coordination, review of subcontractor's commissioning work and documentation thereof for completeness and accuracy prior to submitting for approval to the CA.
- b. Provide the CA with information regarding substitutions, RFIs, change orders and

- any Architect's Supplemental Instructions (ASI) that may affect Commissioning tests, installed systems or the Commissioning schedule.
- c. Provide utility services required for the Commissioning process.
 - d. Cause subcontractors to comply with and supervise subcontractors' means and methods for compliance with all contract documents.
 - e. Ensure safety of personnel and equipment during start-up and commissioning.
 - f. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls and final testing, adjusting, and balancing.
 - g. Designate a Commissioning Coordinator to organize, schedule and coordinate the execution of the GC's and Subcontractor's commissioning responsibilities. The Commissioning Coordinator shall have experience in project management, scheduling and in the technical aspects of mechanical and electrical systems.
 - h. When completion of a task or other issue has been identified as holding up any commissioning process, particularly functional testing, the Subcontractor shall notify the GC within one day of identification. The GC shall within two days of notification of the issue, notify the CA and provide an expected date of completion or resolution of the issue. The GC shall notify the CA within one day of completion. It is not the responsibility of the CA to obtain this status information through meeting attendance, asking questions or field observations.
2. Scheduling and Meetings
- a. Participate in Commissioning Kickoff Meeting with key subcontractors related to commissioning process (including but not limited to: mechanical contractor, electrical contractor, Automatic Temperature Controls contractor).
 - b. Schedule and participate in construction-phase Commissioning coordination meetings.
 - c. Plan, schedule, coordinate and cause and expedite subcontractors to conduct Commissioning and correct deficiencies as quickly as possible.
 - d. Schedule, assist in organizing, and participate in Operation and Maintenance training sessions.
 - e. Participate in final review at acceptance meeting.
3. Documentation and Documentation Review
- a. Review all submittals for accuracy and compliance with the Contract Documents prior to submitting for approval.
 - b. Obtain, organize, and compile all record documents of subcontractors including as-built drawings, operations and maintenance manuals, Cx records, training materials, and warranties/guarantees. Integrate these documents into a master electronic record document provided to the Owner prior to requesting final acceptance. Provide 5 copies of their master record document in electronic format and five copies in bound paper format.
 - c. Develop a Commissioning Tracking Matrix of commissioned equipment in a spreadsheet which includes:
 - 1) Equipment / system name,
 - 2) TAG or ID number,
 - 3) Relevant Specification section number,
 - 4) Submittal reference number,
 - 5) Physical location by room name and number (or other coordinates if room name or number is not applicable).
 - 6) Track status of equipment in the Commissioning Tracking Matrix for:
 - a) Receipt of documentation,
 - b) Submittal reviewed,
 - c) Construction checklist development and execution progress,

- d) Startup, test form development and execution,
 - e) Trend log completion,
 - f) O&M manual submission,
 - g) Training agenda development or receipt,
 - h) Training completion,
 - i) Red-line document submission and
 - j) Seasonal testing.
- d. Ensure that O&M and warranty documentation is complete. Review equipment warranties to ensure that the Owner responsibilities are clearly defined. Meet with the Owner to be sure all Owner responsibilities to maintain enforcement of the warranties are understood
- e. Provide documentation to support the Owners MA-CHPS application.
4. Testing Coordination and Review
- a. Cause pre-functional and functional tests (including seasonal testing) and documentation of such to be performed by responsible subcontractors.
 - b. Evaluate performance deficiencies identified in test reports and the Cx Issues Log and, in collaboration with Contractors responsible for system and equipment installation, recommend and execute corrective action.
 - c. Coordination of Cx with code-required testing such that there is minimal duplicity in efforts by subcontractors and the CA.
 - d. Ensure that applicable equipment and systems are installed properly and receive adequate operational checkout by installing Contractors.
 - e. Verify proper documentation of installed equipment and systems start-up readiness prior to functional testing and final acceptance.
 - f. Verify completeness of the building envelope, perimeter and interior items that effect proper operation and control of HVAC equipment and systems.
 - g. Witness a portion of HVAC piping pressure tests and flushing sufficient for the CA to be confident that proper procedures were followed. Include documentation of all testing in the Commissioning Record.
 - h. Witness any ductwork testing and cleaning sufficient for the CA to be confident that proper procedures were followed. Include documentation of all testing in the Commissioning Record.

1.7 SUBCONTRACTORS' RESPONSIBILITIES

- A. Subcontractors, or approved representatives, shall have the following responsibilities related to Commissioning:

1. General Items

- a. Provide input into the scheduling, creation of, and planning for pre-functional tests as well as functional tests prior to systems/equipment functional testing.
- b. Provide documentation related to startup, testing, and O&M of all systems and equipment to the Commissioning Agent through the General Contractor.
- c. During the start-up and functional testing phase of the project, cause major equipment manufacturers involvement. Require their participation in training sessions for Owner's staff.
- d. Participate in Training of Owner's staff.

2. Meetings and Coordination

- a. Participate in construction-phase Cx planning and coordination meetings.
 - b. Participate in meetings for Cx planning, scheduling, and coordination of Cx activities.
 - c. Participate in final review at acceptance meeting.
 - d. Provide technicians who are familiar with the construction and operation of installed systems to review and comment on proposed test procedures and participate in testing of installed systems, subsystems, and equipment. These technicians shall be made available to the Owner during Cx and training.
 - e. Coordinate with other subcontractor or installer work necessary to make components and systems ready for pre-functional and functional testing.
 - f. Notify the GC when the installation will begin for static assemblies that are being commissioned, dates for pipe and duct system testing, flushing, cleaning, start-up of each piece of equipment and starting of testing adjusting and balancing. Notify the GC ahead of time when commissioning activities not yet performed or not yet scheduled may delay construction.
3. Documentation
- a. Provide the GC with a schedule for documentation deliverables. Update schedule on a regular basis throughout the construction period with more frequency (at least weekly) as requested by the CA towards the end of the Project.
 - b. Maintain red-line documents for subcontractors' coordination drawings during construction. Update after completion of commissioning (excluding deferred seasonal testing).
 - c. Provide record documents as they become available and on no longer than a bi-weekly basis.
 - d. Support the GC in providing equipment and maintenance information as necessary to populate the Owner's computerized maintenance management system.
 - e. Provide detailed annual maintenance plans for each component and system installed.
 - f. Provide the following documentation to the Commissioning Agent through the General Contractor:
 - 1) O&M data submittals,
 - 2) Prepare and deliver one preliminary copy of manufacturers' recommended start-up operation and maintenance manuals within 60 days of receiving equipment submittal approved by the Designers for use by CA.
 - 3) Pre-functional checkout forms.
 - 4) Functional test forms.
 - 5) Review test procedures developed by the CA to ensure feasibility, safety and equipment protection and provide necessary alarm limits to be used during the tests.
4. Testing and Deficiency Correction
- a. Execution of pre-functional inspections and tests of equipment and systems including documentation of such inspections and tests.
 - b. Execution of functional testing and monitoring of equipment and systems, including documentation of tests.
 - c. Conduct seasonal testing as required by Cx specifications.
 - d. Identification and documentation of equipment and system deficiencies and failures, as well as successful correction of such deficiencies and retesting of these components and systems.
 - e. Record daily all issues that arise during the testing, adjusting and balancing (TAB) work, such as damaged or missing duct or insulation, sensors, wiring, valves, dampers, controls, programming, equipment, components, etc. or items that will

reduce the effectiveness of the installation or prevent accurate air and water balancing or systems or building control.

- f. Provide the CA a punchlist of issues during TAB work, through the GC, once a week within 1 day of the end of the reported week.
- g. Each Contractor shall bear the responsibility for all costs associated with Commissioning of the components and systems that they install.
- h. Each Contractor shall be responsible for all costs associated with retesting systems that are not accepted by the CA. These costs shall include the fees for the CA, Owners Project Manager, and other Contractors to be re-involved during the retest.

1.8 COMMISSIONING AGENT'S RESPONSIBILITIES

A. General Items

- 1. Organize and lead the Commissioning Team.
- 2. Assist the GC in scheduling, observing, and reviewing tests, inspections, and systems startup.
- 3. Assist Subcontractors in providing documentation related to the pre-functional and functional testing of equipment

B. Field Work and Inspections

- 1. The CA will make periodic visits to the site to observe progress of equipment and system installations.
- 2. The CA will observe construction and report to the Cx Team relative to progress and deficiencies.
- 3. In addition to compliance with the OPR, BOD, and Contract Documents, the CA will inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.

C. Meetings and Coordination

- 1. Attend selected planning and job-site meetings in order to remain informed on construction progress and to update parties involved in Commissioning.
- 2. Convene Commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the Commissioning processes. Responsibilities include preparing agenda and attendance lists, preparing minutes to Commissioning team members and attendees for distribution by the GC.
- 3. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the Commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.
- 4. Later during the final phases of construction, the CA, through the Owners Project Manager and GC will request frequent coordination and planning meetings involving various Commissioning team members.

D. Documentation

- 1. Prepare a construction-phase Commissioning plan. The CA will collaborate with the General Contractor and subcontractors to finalize test and inspection procedures.
- 2. Review and comment on submittals from each Contractor for compliance with the OPR and BOD, Contract Documents, and construction-phase Commissioning plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BOD.
- 3. The CA will prepare Commissioning Reports.
- 4. Document date of acceptance and startup for each item of equipment for start of warranty periods.

5. Review Project Record Documents. Request revisions from Contractor to achieve accuracy. Project Record Documents requirements are specified in Division 1 and other trade specific specification Sections.
6. Review and comment on the operation and maintenance training program submitted by the General Contractor and Subcontractors.

1.9 COMMUNICATION PROTOCOLS FOR COMMISSIONING ISSUES

Issue	Protocol
For requests for information (RFI) or formal documentation requests	The CA goes first through the Owners Project Manager who will inform the GC who will track and process all RFIs with the appropriate Cx team member.
For minor or verbal information and clarifications	The CA goes direct to the informed party.
For notifying Contractors of deficiencies	The CA documents deficiencies through the Owners Project Manager and GC, but may discuss deficiency issues with subcontractors prior to notifying the Owners Project Manager.
For scheduling functional tests or training	The CA may provide input for and do some coordination of training and testing, but scheduling and organizing shall be coordinated by the GC.
For scheduling Commissioning meetings	The CA selects the date and schedules through the Owners Project Manager and the GC.
For making a request for significant changes	The CA has no authority to issue change orders.
Subcontractors disagreeing with requests or interpretations by the CA and/or Design team members shall	Work through GC who will Work with CA directly or through the Owners Project Manager to resolve the situation. Final decision making authority rests with the Owner.
For Cx issues and deficiencies resolution or design clarifications	The CA will note the issues/deficiencies and/or request clarifications, resolutions through the Architect or General Contractor as appropriate.

1.10 COMMISSIONING DOCUMENTATION

- A. Owner's Project Requirements (OPR): A written document, prepared by the Architect and CA for the Owner that details the Owner's functional requirements of Project and expectations of how it will be used and operated.
- B. Basis of Design (BOD) Document: A document, prepared by Architect, and Engineers and design build Contractors, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and quantitative assumptions that support the design process.
- C. Commissioning Plan (Cx Plan): A document, prepared by CA, that outlines the Cx process,

description of responsibilities, and documentation requirements of the Commissioning process, and shall include, but is not limited to the following:

1. Prepare a plan for the delivery and review of submittals of equipment and/or systems being commissioned. Provide a description of submittals that are required to support the Commissioning processes.
 2. Description of the organization, layout, and content of Commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
 3. Identification of systems and equipment to be commissioned.
 4. Description of testing procedures along with identification of parties involved in performing.
 5. Description Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 6. Provide responsibilities of Commissioning team members.
 7. Description of requirements for operation and maintenance training.
 8. General process for completing pre-start and startup checklists for systems, subsystems, and equipment to be verified and tested.
- D. Pre-Functional Checklists and Functional Tests: The CA, with the assistance of the Designers and Contractors shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks for each item to be tested. Each respective subcontractor shall provide input on the contents, scheduling and procedures of each test in order to finalize them prior to using them. The CA shall have the sole authority to accept or reject these changes. Space will be provided for testing personnel to sign off on each checklist. Pre-functional checklists shall be filled out electronically by the responsible subcontractors, hand written submissions are not acceptable. Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
1. Name and identification of tested item.
 2. Test number.
 3. Time and date of test.
 4. Indication of whether the record is preliminary or final, and whether the record is for a first test or retest following correction of a problem or issue.
 5. Dated signatures of the person performing test and of the witness, if applicable.
 6. Individuals present during the test.
 7. Results of the test.
 8. Deficiencies and corrective actions recommended, as well as time frame for retesting
- E. Certificate of Commissioning Readiness: Certificate of Commissioning Readiness shall be signed by each Contractor, Subcontractor(s), Installer(s), and the General Contractor certifying that systems, subsystems, equipment, and associated controls are ready for functional testing. Completed pre-functional checklists signed by the responsible parties shall accompany this certificate.
- F. Certificate of Commissioning Substantial Completion: Certificate of Commissioning Substantial Completion shall be signed by each Contractor, Subcontractor(s), Installer(s), and the General Contractor certifying that systems, subsystems, equipment, and associated controls have been successfully tested. Completed functional test results signed by the responsible parties shall accompany this certificate.
- G. Issues Log: The CA shall prepare and maintain an issues log that describes design, installation, and performance issues that require follow-up action, are at variance with the Contract Documents or have been identified as deficiencies. The issues log will identify and track issues as they are encountered, documenting the status of unresolved and resolved issues. The CA will review this issues log with the Contractors on a regular basis, provide additions and deletions and will have the authority for approving all deletions. Satisfactory

resolution of all items in the issue log which require action or documentation by the Contractor shall be a prerequisite to final acceptance

- H. Systems Manual: The General Contractor shall assist the CA in gathering the required information and compile systems manual. The GC shall provide all documentation electronically in a format which is logically organized by topic and subcontractor's trade. Systems manual shall include, but is not limited to, the following:
1. Project Record Documents, including as-builts, a record copy of Construction Meeting Minutes, Requests for Information, Architectural Supplemental Instructions, change order directives, etc.
 2. Record copies of final Cx testing results
 3. Final Commissioning Plan.
 4. Commissioning Report.
 5. Operation and Maintenance data
 6. Building Automation System Commissioning as-built records
 7. Testing, Adjusting and Balancing Final Report
 8. Warranties and Guarantees
 9. Owner's Computerized Maintenance Management System (CMMS) Database.

1.11 COMMISSIONING SUBMITTALS

- A. The following list of submittals provides a list of submittals related to the commissioning process. This list is not all inclusive and additional submittals are required in other paragraphs of this specification and other specification Sections.
1. Pre-functional and Functional Test Checklists and Report Forms: The design team and CA shall prepare and submit sample checklists and forms to the General Contractor who will review and distribute to subcontractors for their review and comment. Drafts of many of these forms have been provided in these Contract Documents. Exclusion or omission of checklists or test forms from the Contract Documents does not relieve the General Contractor or subcontractors from commissioning any equipment or systems requiring commissioning. The General Contractor shall then forward the recommended revisions to the CA who will either accept or reject these recommendations.
 2. Certificates of Readiness and Substantial Completion: The GC shall submit Certificates of Readiness and Certificates of Substantial Completion.
 3. Test and Inspection Reports: The GC shall submit test and inspection reports executed by subcontractors including those required by, witnessed, and approved of by local authorities having jurisdiction.
 4. Corrective Action Documents: The GC shall submit documents verifying that corrective actions have occurred when, deficiencies have been identified during the Cx process.
 5. Design Submittals: CA will identify submittals for which copies shall be submitted to the CA. Submit copies of selected submittals to CA after the design engineer has reviewed them. The General Contractor shall allow fourteen days for the CA to review such submittals.
 6. Submit copies of the following documents from the BAS and TAB Contractors:
 - a. Work Plan including Commissioning Procedures for BAS including instrumentation calibration.
 - b. TAB Plan and Preliminary Results Report.
 - c. Status Reports.
 - d. Final Reports.

7. Commissioning Schedule: The General Contractor and trade specific subcontractors shall submit detailed coordinated schedules for manufacturers start-up services, pre-functional checkouts, functional tests, test results, as-built construction information, and training for each phase of the Project as well as the final integrated systems commissioning. The General Contractor is responsible for creating and maintaining this schedule. Incorporate all commissioning milestones into the Master Construction Schedule. This Project involves phased construction and phased commissioning. The GC and subcontractors shall submit Cx schedules for each phase and the final integrated systems commissioning. Provide weekly schedule updates during the functional testing phase of the Project. The General Contractor and Subcontractors shall produce and update a Cx milestones schedule for each phase of the Project which shall include:
 - a. Commissioning meetings,
 - b. Submission of material and equipment (including control equipment) submittals, including manufacturer's operations and maintenance documentation,
 - c. Coordination drawing submission,
 - d. Submission of automatic control and building automation controls logic diagrams,
 - e. Submission of automatic control and building automation controls software
 - f. Training program,
 - g. Equipment delivery, installation, and manufacturer's start-up.
 - h. Equipment placement review,
 - i. Pre-functional Checklist completion,
 - j. Equipment and systems functional testing dates,
 - k. Initial automatic controls and building automation system pre-functional checks including point to point tests, graphics completion, and date of initial readiness for use in the TAB process,
 - l. Testing, adjusting, and balancing report plan and preliminary and final,
 - m. Final automatic controls and building automation system functional testing and trend log period,
 - n. Test verification,
 - o. Systems Manual record documentation submission,
 - p. Operator, maintenance, and occupant training,
 - q. Turnover of systems, including the start of warranties,
 - r. Dates for contractor site visits during first year of operation,
 - s. Seasonal testing.
8. The GC shall submit preliminary Equipment Start-Up and Operation & Maintenance manuals to the CA.
9. The GC shall submit Contractor's test reports to CA upon successful completion of each test.
10. The GC shall submit a schedule of manufacturer's representative start-ups, and all inspections and pre-functional and functional tests schedule to CA at least two (2) weeks prior to the start of testing.
11. The GC shall submit the completed Pre-Functional and preliminary Functional Tests of the Building Automation System and the Test and Balance Report to the CA for review and approval within two weeks of completion of work and prior to commencement of HVAC system functional performance tests. System functional performance testing shall not commence until the system pre-functional and preliminary functional tests of the controls/BAS system and TAB is complete. Submit two weeks of 15 minute trend data logs as part of functional testing.
12. The GC shall submit final equipment and operations and maintenance data for equipment specified in an electronic format compatible with the Owner's Computerized

Maintenance Management System (CMMS). All component and system completed [CMMS] forms are to be furnished to the CA 30 days prior to the start of the first functional test.

13. The GC shall submit a training agenda and syllabus, including topics to be covered during the training and listing who will be the instructor(s) for each piece of equipment and/or system. Modify the agenda and syllabus to incorporate the changes requested by the CA.
14. The GC shall submit detailed Preventative Maintenance plan with scheduled tasks prior to commissioning substantial completion certificates.

1.12 EQUIPMENT MANUFACTURERS REPRESENTATIVES

- A. Each respective subcontractor shall provide factory-authorized service representatives experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment:

1. Variable Speed Drives
2. Fire Alarm, Fire Protection System, and other life and safety systems
3. Stand-by/Emergency Generator
4. BAS (Building Automation System)
5. HVAC equipment
6. Lighting controls
7. On-site renewable energy systems (solar PV & thermal, etc)
8. Switchgear
9. Domestic Hot Water System
10. Kitchen Hood Control System
11. Fire Apparatus Tail Pipe Exhaust System

1.13 COORDINATION

- A. Coordinating Meetings:

1. CA shall request that the GC schedule periodic coordination meetings involving members of the Commissioning team to review progress on the Commissioning plan, to discuss scheduling conflicts, and to discuss upcoming Commissioning process activities. The GC shall require the respective subcontractors to attend these meetings. The GC shall require all subcontractors who worked on the installation of the specific equipment and systems to Work cooperatively together to commission the Projects equipment and systems and to provide the required documentation and to correct all deficiencies.

- B. Pre-Testing Meetings:

1. The GC shall convene meetings and Contractors shall participate with the Commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

- C. Testing Coordination:

1. The GC shall coordinate sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

D. Manufacturers' Representative Services:

1. The representative subcontractor shall coordinate the schedule for manufacturer's representative start-up and training services through the General Contractor.

1.14 QUALITY ASSURANCE

- A. The General Contractor and all subcontractors participating in the Commissioning process shall warrant that their documentation of the results of their pre-functional and functional tests is as accurate and complete as possible. The Commissioning process is intended to be completed prior to Project Substantial Completion and prior to occupancy by the Owner. This requires that tasks associated with Commissioning including its documentation, sufficient time to troubleshoot and correct deficiencies, and the Owners training be incorporated into the Project timeline. Many Commissioning tasks cannot be completed until other construction tasks are completed, including specific general construction items such as the installation of ceilings. The General Contractor is responsible for overall scheduling and causing the Work of all Contractors to be complete such that there is adequate time to complete the Commissioning process prior to Substantial Completion and the Owners occupancy.
- B. The General Contractor shall be responsible for digitally photographing and labeling photographs with a date and narrative explaining the image capturing construction progress on at least a weekly basis. The General Contractor shall review the photographic documentation and shall make photographic documentation available to the Owners Project Manager as requested. Prior to Substantial Completion of the photographic documentation five electronic copies and five color print hard copies shall be provided to the Owner. Each photograph shall be at least 5"x7" in color.
- C. The General Contractor is responsible for enforcing commissioning with all subcontractors and is responsible for ensuring that all general construction activities necessary to protect equipment and systems from contamination and damage are followed.
- D. The General Contractor is responsible for ensuring general construction and trade subcontractors complete their work in a timely fashion to allow for the completion of ATC, TAB, and Cx activities for each phase prior to building occupancy.

PART 2

2.1 EQUIPMENT NECESSARY FOR COMMISSIONING:

- A. Subcontractors are responsible for providing all equipment necessary to complete Commissioning including functional testing.
- B. The CA shall have authority to require the subcontractor to substitute specific testing equipment being used is not calibrated, accurate, or appropriate for the test being conducted. The alternate equipment required by the CA shall be provided by the Contractor responsible for the test at no additional cost to the Owner.
- C. Test Equipment Calibration: Comply with test equipment manufacturer's calibration procedures and intervals. Submit a list of test instruments and their individual calibration certificates prior to using them. Instruments shall have been calibrated within manufacturer's recommended calibration periods prior to use.

PART 3

3.1 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Training Preparation Meeting:

Before the operation and maintenance training sessions, the General Contractor shall convene a training preparation meeting including the Owner's Project Manager, members of the A/E team, the CA and each Contractor, and subcontractor. In addition to requirements specified in Division 1, the General Contractor and respective subcontractor shall perform the following:

1. Review the Design Intent,
2. Review installed systems, subsystems, and equipment,
3. Review instructor qualifications,
4. Review instructional methods and procedures,
5. Review training module outlines and contents,
6. Review course materials (including operation and maintenance manuals),
7. Determine meeting location(s) in advance and assess all preparation(s) required for training and instruction,
8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays,
9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

B. General Contractor Training Responsibilities:

1. The General Contractor shall develop an instruction program that includes individual training modules for each system, subsystem, and equipment as specified in Division 1 Section "Demonstration and Training." This project includes multiple phases and portions of the work within each phase. Training will be required for systems and equipment placed in service at each interval, and then may be required again at the end of the Phase as an integrated final system. The training shall include "hands-on" (in the field) training as well as classroom training.
2. The General Contractor shall submit the schedule, outline, and presentation materials to the CA for review and approval 60 days prior to the first training session or 60 days prior to turning over spaces and equipment for use by the Owner, whichever comes first.
3. The General Contractor shall audio/video record all training and shall provide a copy of the recording to the Owner.
4. The General Contractor shall provide training for the teachers and administrative staff.
5. The General Contractor shall create a User Guide to be distributed to each classroom for use by its occupants.
6. The General Contractor shall cause subcontractors to involve major equipment and systems manufacturer's representatives in the training. This training shall separately schedule on dedicated training days, include in addition to any onsite training during start-up.
7. The General Contractor shall provide a record of everyone who attended the training, the date it occurred, and a record copy of all training material. The owner may, at their discretion, defer some or all of these training hours to any subsequent date(s) and time(s) during the first year warranty period.
8. The General Contractor shall ensure that all subcontractors include the training hours for the operating staff as a minimum on the operation and maintenance of the following systems;

Electrical Systems	Field Hours	Classroom Hours
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Lighting Controls (day-lighting, occupancy, centralized control, etc.)	8	8
Emergency Lighting	4	4
Switchgear	4	4
Life and safety systems including standby generator and fire alarm	8	8
Mechanical Systems	Field Hours	Classroom Hours
HVAC Overview (cover the design and operating intent of hot water systems, central air systems, ventilation systems, discuss the TAB and how the controls and TAB are integrated in the operation of the building)	8	8
Building Automation System (BAS)	See spec paragraph in this section	See spec paragraph in this section
Pumping systems	8	8
Rooftop Units, Air Handlers, Heat Pumps, all Exhaust Fans	16	8

Terminal Devices: VAV boxes, Unit Heaters	16	8
Variable Refrigerant Flow Heat Pumps	8	8
Chemical Treatment (including glycol)	4	4
Variable Frequency Drives	8	8
TAB	16	8
Instrumentation	8	4
Boilers	8	8
Tail Pipe Exhaust	4	4
Kitchen Exhaust and Make Up Air System	4	4
Plumbing Systems	Field Hours	Classroom Hours
Fire protection system	8	8
Flow control devices (back flow preventers)	4	2
Pumping systems	4	4
Domestic hot water systems	8	4

C. Participation in Training Exercises:

1. Training shall consist of, as needed and at the discretion of the Owner and CA, the installing technician, installing Subcontractor and the appropriate trade or manufacturer's representative on each major piece of equipment. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece(s) of equipment as installed in this Project is required. The controls Subcontractor shall attend and be present at sessions in addition to the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed

D. Training Agendas:

1. For each piece of equipment or system a written training agenda will be provided by the CA for use by the Subcontractor. The generic agenda has been provided for typical equipment at the end of this Section. A similar, but more in-depth agenda will be provided prior to training, for the controls system. The agenda shall cover the following

elements:

- a. Equipment (included in training),
- b. Intended audience,
- c. Location of training,
- d. Objectives,
- e. Subjects covered (description, duration of discussion, special methods, etc.),
- f. Duration of training on each subject,
- g. Instructor for each subject,
- h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.).

E. Training Process Overview:

1. As appropriate, normally start with classroom-type sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc. Involve the manufacturer's representatives for the major equipment and systems. The manufacturer's representatives training shall be scheduled for specific dates which are not coincident with their start-ups in order to avoid scheduling conflicts.
2. During any demonstration, should the system fail to perform in accordance with the requirements of the operation and maintenance (O&M) manuals or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
3. Follow the outline in the table of contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
4. If the equipment manufacturers representative or contractor providing the instructions is deemed to be unprepared or unqualified by the CA, owner, or OR then the training shall be rescheduled and held with appropriate improvements at no cost to the owner. If this occurs, the contractor responsible for the training shall be back-charged for all consultants attending the rescheduled training.

F. Training Shall Include the Following:

1. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
2. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover, as applicable, and any emergency procedures.
3. The mechanical Subcontractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
4. Discussion of relevant health and safety issues and concerns.
5. Discussion of warranties and guarantees.
6. Common troubleshooting and maintenance issues, problems and solutions.
7. Explanatory information included in the O&M manuals and the location of all related plans and manuals in the facility.
8. Discussion of any peculiarities of equipment installation or operation.
9. The format and training agenda in ASHRAE Guideline 1, HVAC & R Technical Requirements for the Commissioning Process
10. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.

G. ATC Contractor Training Responsibilities

1. The ATC subcontractor shall have the following special training responsibilities relative to the HVAC control systems:
 - a. For the primary HVAC equipment, the controls Subcontractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others
 - b. The standard operating manual for the system and any special training manuals shall be provided for and retained by each trainee. In addition, the system technical manual shall be demonstrated during training. Manuals shall include detailed description of the subject matter for each session. The manuals shall cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals and in all software displays. Manuals will be approved by the CA
 - c. The trainings will be tailored to the needs and skill-level of the trainees and be oriented to the specific system installed in this Project
 - d. The trainers shall be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified trainer(s) shall be used. The Owner shall approve the instructor prior to scheduling the training
 - e. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated.
 - f. There shall be three training sessions:
 - 1) Training Session 1 - Control System:
 - a) The first training shall be 8 hours in length. This training shall be held on-site. Upon completion, each trainee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system. The number of trainees for Training I shall be approximately 8, conducted in two separate sessions of 4 hours each. The Controls Subcontractor shall provide 4 laptops, an overhead Projector connected to the instructor's laptop, plus the permanent work station with network connections and the controls operating system installed and functioning for this building in the training room for use by the trainees.
 - 2) Training Session 2 - Building Systems:
 - a) The second session shall be held on-site for a period of 16 hours of actual hands-on training after the completion of system commissioning. The number of trainees for Training II shall be approximately 8, conducted in two separate sessions of 8 hours each. The Controls Subcontractor shall provide 4 laptops, an overhead Projector connected to the instructor's laptop plus the permanent work station with network connections and the controls operating system installed and functioning for this building in the training room for use by the trainees. The session shall include instruction on:
 - i. A review of the as-built drawings and O&M manuals,
 - ii. A walk-through of the facility to identify control panels and device locations,
 - iii. Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.
 - iv. Security levels, alarms, system start-up, shut-down, power outage and restart routines,
 - v. Changing set points and alarms and other typical changed parameters
 - vi. Overrides, freeze protection, manual operation of equipment,

- vii. Optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
 - viii. All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends.
 - a. Trainees will actually set-up trends in the presence of the trainer. Every screen shall be completely discussed, allowing time for questions.
 - ix. Description of special software such as demand limiting, energy reporting and continual commissioning routines and how to use them to lower energy costs and trouble shoot.
 - x. Use of keypad or plug-in laptop computer at the zone level.
 - xi. Use of remote access to the system via phone lines or networks.
 - xii. Setting up and changing an air terminal unit controller.
 - xiii. Graphics generation.
 - xiv. Point database entry and modifications.
 - xv. Understanding BAS field panel operating programming (when applicable).
- 3) Training Session 3 - Deferred On-Site:
- a) The final training will be conducted on-site at the time of the seasonal testing periods, and during the 8-10 months after occupancy and consist of 8 hours of training in each session. The session will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the systems, and discuss changes made or proposed to optimize the performance of the system.

H. TAB Contractor Training Responsibilities:

- 1. The TAB technician shall meet with facility staff after completion of TAB and instruct them on the following.
 - a. Go over the how the systems were tested and balanced, final TAB report, explaining the layout and meanings of each data type.
 - b. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
 - c. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
 - d. Discuss any temporary settings and steps to finalize them.
 - e. Other salient information that may be useful for facility operations, relative to TAB.
- I. Training Documentation:

The General Contractor shall develop and within 60 days of occupancy (or at a time directed by the Owner) train the teachers and administrative staff in the operations of the lighting, heating and cooling systems, and life safety, in all rooms of the facility. The General Contractor shall include at least 16 hours for this training. The General Contractor shall create a room users guide for each room of the facility explain how to operate the building infrastructure utilities, equipment and systems in each room. One copy shall be posted in each room and five record hard copies and five electronic copies shall be provided to the Owner prior to substantial completion.

3.2 MEETINGS

A. Commissioning Kickoff Meeting

Within 30 days of commencement of construction, the CA will schedule, plan and conduct a commissioning kickoff meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CA through the General Contractor.

- B. The CA and the GC will convene commissioning team meetings, the mechanical contractor, electrical contractor, controls and systems integrator(s), TAB, and any other specialists required to commission the systems. These meetings will occur with increasing frequency as systems approach construction completion and will be held weekly during commissioning.
- C. TAB and Controls Coordination Meetings. Special commissioning team meeting(s) will be convened by the CA as required to address the control system and the TAB activities.
 - 1. Controls Meetings: There shall be periodic meeting as necessary to review the sequencing, coordination with other trades (for example fire and life safety, lighting) and completion of control system installation activities. Attendees include the commissioning agent, mechanical design professional, owner's operation and maintenance representative, general contractor, mechanical contractor, control contractor, TAB contractor, electrical contractor, and fire alarm contractor. The following items are addressed during this meeting.
 - a. A meeting early during construction shall be held with the mechanical designer, commissioning agent, controls contractor, and owner to review and discuss controls issues prior to control programming and the controls formal submittal. Items to be covered include system architecture, control drawing format and content, sequences of operation details and logic, control database, point naming convention, alarms, graphic screens, location of critical sensors, time of day scheduling, and other coordination issues.
 - b. Control package submittal
 - c. On-going point-to-point control system verification requirements as well as other information on the pre-functional and functional testing.
 - d. Resolution procedures to be followed.
 - e. Mechanical and Electrical readiness and schedule of controls completion.
 - f. Involvement in commissioning test completion at end of the Project.
 - 2. TAB Meetings: There shall be periodic meetings to review the sequencing, coordination with other trades and completion of control system installation activities. Attendees include the commissioning Agent, mechanical design professional, owner's operation and maintenance representative, general contractor, mechanical contractor, control contractor, TAB contractor, and electrical contractor. The following items are addressed during this meeting.
 - a. Sequencing of events (mechanical and electrical readiness, system start-up, TAB, TAB verification).
 - b. TAB contractor test report forms and submission procedures.
 - c. Identification, documentation, and resolution of issues identified by TAB contractor.
 - d. Interface between TAB contractor, controls contractor, mechanical contractor, and electrical contractor.
- D. Temporary or Early Startup of Equipment:
When equipment will be used in a temporary mode prior to operating the equipment permanently, a meeting shall be held that discusses the issues surrounding indoor environmental quality, moisture intrusion, building pressurization, duct and equipment cleanliness, checkout of safeties and fire alarm and protection, etc. The GC shall avoid permanently installed systems for temporary environmental control - If the owner allows the temporary use of installed systems, such use shall mean that the system has been accepted by the owner, or that the system has been functionally tested. In no case shall operation of the equipment take place without pre- functional checkout and completion of a Certificate of Readiness for such equipment

E. Miscellaneous Meetings:

Other meetings will be planned and conducted by the CA as construction and training progresses. These meetings will cover coordination, deficiency resolution planning, and training issues with particular subcontractors. The CA will plan these meetings and will minimize unnecessary time being spent by Subs.

3.3 PHASED COMMISSIONING

- A. If the Project will require startup and Commissioning to be executed in phases and as portions of the work are completed. This phasing will be planned and scheduled in coordination meetings of the CA, CM, design team, Project Owner's Manager, Owner, and all trades. The responsibility of planning the phasing and proposing this phasing with regard to the Commissioning shall be the General Contractors since the General Contractor controls the scheduling and means and methods of the construction. The General Contractor shall to the greatest extent possible incorporate the CA comments and recommendations regarding Commissioning events and phasing.
- B. This project involves at least two phases of completion which requires the commissioning to be completed as each portion of work within each phase is completed, and as a final total building integrated systems commissioning process. The purpose of the final total building integrated systems commissioning is to test all commissioned systems verifying that all systems operate properly as an integrated system. This will require equipment and systems to be tested, balanced and commissioned more than once.

3.4 REPORTING

- A. The CA will provide regular reports to the Cx Team, with increasing frequency as construction and Commissioning progresses.
- B. The CA will regularly communicate with all members of the Commissioning team, keeping them apprised of Commissioning progress and scheduling changes through memos, progress reports, etc.

3.5 SUBMITTALS

- A. The CA will review submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the Commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of functional testing procedures.
- B. The CA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the design intent documentation and sequences provided with the Specifications. All Contractors shall review specific trade sections of the contract documents for additional submittal requirement. Particular attention is called to the control submittals and O&M requirements related to the commissioning requirements.
- C. The O&M manuals and maintenance plans are the responsibility of the General Contractor and their respective subcontractors, and the CA will review, comment on, and approve or reject them and incorporate them into the Systems manuals. In the event that the CA rejects the O&M manuals and maintenance plans as insufficient and/or incomplete and lacking enough detail, the responsible Contractors shall improve and resubmit the documents

3.6 START-UP, PRE-FUNCTIONAL CHECKLISTS AND INITIAL TESTING

- A. The following procedures apply to all equipment to be commissioned;

- B. The purpose of the pre-functional checklists is to have the installing Contractor confirm and record what was actually installed and to verify and document that each piece of installed equipment has been checked to verify that the installation is complete and that the equipment is ready to be safely started and put into operation for the purposes of functional testing. This means in part that each piece of equipment being signed off as pre-functionally ready has all related utilities in place and ready to supply that equipment, and that controls, safeties, and interlocks are in place and have been checked for proper control of that equipment. Manufacturer's Representative start-up procedures are part of the pre-functional check out. Each piece of equipment receives full pre-functional checkout. No sampling strategies are used. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- C. The subcontractor responsible for the installation of the equipment develops the full pre-functional start-up plan by combining the manufacturer's detailed start-up and checkout procedures from the O&M manual and the CA's draft pre-functional and functional procedures. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan. The pre-functional checkout documentation shall be in electronic format, hand written documentation is not acceptable.
- D. The manufacturer's standard written recommended start-up procedures with check boxes by each procedure and a signature block added on the document.
- E. The manufacturer's normally used field checkout sheets.
- F. In the event that a draft pre-functional checkout or functional test has not been provided by the CA, the installing subcontractor submits the Cx procedure (pre-functional and functional) to the CA for review and approval. All manufacturers' start-up test plans and record documentation shall be submitted to the CA for review at least 30 days in advance.
- G. The CA reviews and requests additional detailed check-out procedures and approves or rejects (requesting resubmittal) the procedures and the format for documenting them.
- H. The control system pre-functional checkout shall confirm that the control system operation is functional prior to the TAB and then the control system shall be functionally tested after TAB is complete.
- I. The control system pre-functional checkout shall confirm functionality and compliance with intent for each individual sequence module in the sequences of operation,
- J. Functional testing shall prove proper operation of all control strategies, energy efficiency, and self-diagnostics features by stepping through each sequence and documenting equipment and system performance. The functional testing shall test every step in every written sequence and other significant modes, sequences, and operational features not mentioned in written sequences including startup, normal operation, shutdown, scheduled on and off, unoccupied and manual modes, safeties; alarms, overrides, lockouts, and power failure and recovery.
- K. Pre-functional checkouts shall confirm all alarm and high-limit and low-limit functions and messages generated on all points with alarm settings,
- L. Functional testing shall prove integrated performance of all components and control system components, including all interlocks and interactions with other equipment and systems,
- M. Pre-functional checkout shall confirm automatic shutdown and restart capabilities both for scheduled and unscheduled events (e.g., high pressure shutdown and normal scheduled start/stop),

- N. The controls contractor shall test to ensure proper sequencing of heat transfer elements as required to prevent inappropriate simultaneous heating and cooling, and that equipment and systems are staging properly.
- O. Pre-functional testing shall confirm control system stability and tuning by upsetting various control loops under different load conditions and observing the system response,
- P. Pre-functional testing shall confirm time-of-day schedules and set points,
- Q. Functional testing shall confirm all energy-saving control strategies, including optimum start stop, demand limiting, reset schedules, change of modes from heating to economizer, economizer to cooling, cooling to economizer, and economizer to heating,
- R. Pre-functional testing shall confirm that control system graphics are representative of the systems and that all points and control elements are in the same location on the graphic as they are in the field.
- S. Execution of Pre-Functional Checklists and Startup:
 - T. The Subcontractors shall provide two weeks' notice of pre-functional check-outs executes the Cx procedure and provide the GC with a signed and dated copy of the completed start-up and pre- functional tests and checklists. The GC shall confirm through supervision that the Cx procedure is complete and that the documentation is accurate. The CA may choose to witness or verify these checkouts post submission of their documentation at their own discretion. In the event that the CA choses to verify these check-outs post documentation the respective subcontractor shall provide labor and equipment to support such verification as part of the Contract base bid.
 - U. Only individuals that have direct knowledge and witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.
 - V. The GC shall forward the Cx documentation to the CA for the review and verification. The GC shall witness the Contractors Cx Work or shall verify a statistical sample of the subcontractors Cx procedures by requesting that the subcontractor recreate the test results while in the presence of the CA.
- W. Deficiencies, Non-Conformance and Approval in Checklists and Startup:
 - X. The Subs shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the CA within two days of test completion.
 - Y. The CA shall review the Cx documentation and submit either a non-compliance report or an approval to the General Contractor. The General Contractor shall cause correction of the deficiencies prior to applying for Substantial Completion. When satisfactorily completed, the CA recommends approval of the execution of the Commissioning of each system to the GC
 - Z. Items left incomplete, or deficient, or which later cause deficiencies or delays during functional testing and/or the warranty period may result in back charges and/or retain age to the responsible party.

3.7 FUNCTIONAL PERFORMANCE TESTING

- A. This sub-Section applies to all Commissioning functional testing for all divisions.
- B. The parties responsible to execute each test are all Contractors who installed, or have

controls or interconnected equipment and/or systems to the equipment or systems being tested.

C. Objectives and Scope:

1. The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of Substantial Completion to full dynamic operation including all modes of normal and emergency conditions such as loss and restoration of power. Additionally, during the testing process, areas of deficient performance shall be identified and corrected, improving the operation efficiency, and functioning of the systems.
2. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) loss of power, and restoration or power where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Specific modes required in this Project are given in herein as well as each respective specification Section.

D. Development of Test Procedures:

1. Before test procedures are finalized, the GC shall provide the CA with all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters.
2. The CA shall Work with all responsible subcontractors to develop and finalize specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Subcontractor or vendor responsible to execute a test, shall provide assistance to the CA in developing the procedures by reviewing and recommending procedures, improvements to drafts provided by the CA, proposing manufactures recommended start-up procedures and check-outs, (answering questions about, equipment, operation, sequences, etc.). Prior to execution, the CA shall provide a draft copy of the test procedures to the Subcontractor(s) who shall review the tests for feasibility, safety, equipment and warranty protection. In the event that a draft pre- functional checkout or functional test has not been provided by the CA, the installing subcontractor submits the Cx procedure (pre-functional and functional) to the CA for review and approval.
3. The CA shall review Owner-Contracted, factory testing or required Owner acceptance tests, including documentation format, and shall determine what further testing or format changes may be required to comply with requirements of the Contract Documents.
4. The test procedure forms developed generally shall include (but not be limited to) the following information:
 - a. System and equipment or component name(s)
 - b. Equipment location and ID number
 - c. Date
 - d. Project name
 - e. Participating parties
 - f. Specified parameters being verified
 - g. Required field measurements
 - h. Alarm limits, etc.
 - i. General procedures to execute the test
 - j. Expected values and outcomes measured values and outcomes, proposed follow-up actions, and final results.
 - k. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was

achieved.

- l. A section for comments
- m. Signatures and date block for the participants.

E. Test Methods:

1. Functional performance testing and verification shall be achieved by recording automatic operation, manual testing (persons manipulate the equipment causing intended change and the reaction of the system, recording the performance) and by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CA may substitute specified methods or require an additional method to be executed, other than what was specified, or proposed, if the specified or proposed testing is not adequate to sufficiently exhibit expected compliance with intended results, the design intent, and/or the Owner's Project Requirements.
2. Simulated Conditions - Simulating conditions shall be allowed; though timing the testing to experience actual conditions is intended wherever practical.
3. Overwritten Values - Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible.
4. Altering Set points - Rather than overwriting sensor values, and when simulating conditions is difficult, altering set points to test a sequence is acceptable. For example, to see the AC compressor lockout works at an outside air temperature below 55F, when the outside air temperature is above 55°F, temporarily change the lockout set point to be 2F above the current outside air temperature or simulate an outside temperature below 55.

F. Setup

1. Each function and test shall be performed under conditions that simulate actual conditions and varying operating conditions as close as is practically possible. The Subcontractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Subcontractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition. Safety of personnel and equipment shall be of paramount concern and methods, communications related to safety and safe testing procedures ensuring safe testing shall be the responsibility of the General Contractor and each respective subcontractor conducting the testing.

G. Coordination and Scheduling

1. The Subcontractors shall provide sufficient notice (at least two weeks) to the GC who will notify the CA regarding their completion schedule for the pre-functional checklists and startup of all equipment and systems. The CA shall verify the functional testing. The Subcontractors shall execute the tests.
2. In general, functional testing is conducted after pre-functional testing and manufacturer's startup has been satisfactorily completed. The control system must be sufficiently tested and approved by the CA before it is used for TAB or to verify performance of other components or systems.

H. Problem Solving

1. The CA will recommend solutions to problems found; however the burden of responsibility to solve, correct and retest problems is with the GC, subcontractors and design team.

3.8 NON-CONFORMANCE AND APPROVAL OF TESTS

A. Non-Conformance:

1. Verification through statistical sampling;
2. The CA may choose to verify pre-functional check-outs and functional testing results by witnessing the tests or sampling a statistical quantity of equipment and/or systems which the contractor has documented as having been pre-functionally checked or functionally tested. Most major equipment and systems which are critically important or having a large sphere of influence over large spaces or other systems will be 100% verified. Other systems with multiple identical component types which have limited influence on the overall operation of the building will have a smaller percentage of their overall population verified. The verification process will generally proceed as follows;
3. Corrections of minor deficiencies identified may be made during the tests. In such cases the deficiency and resolution will be documented in documentation of results.
4. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues.
5. Cost of Retesting:
 - a. The cost for the subcontractors to retest a pre-functional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated between the subcontractors and the GC.
 - b. The time for the CA to witness any retesting required because a specific pre-functional checklist or functional test item, reported to have been ready for testing or successfully completed, but determined during functional testing to be not ready for functional testing or deficient, will be back charged to the responsible contractor.
 - c. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the General Contractor or subcontractor(s).

B. Approval

1. Formal approval of the functional test is made after review by the CA. The CA recommends acceptance or rejection of each test to the Owner and GC.

3.9 DEFERRED TESTING

A. Unforeseen Deferred Tests:

If any check or test cannot be completed due to the construction phasing and/or progress, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the CA. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary Contractors are part of their base bid Contract amount. The intent of the Cx is to pre-functionally check and functionally test the systems listed in this specification. If test and documentation scope for these items changes or if specific tests forms have not been developed and included as part of this specification, they will be developed during construction and these Cx efforts shall not be considered as additional scope. Services of necessary contractors are part of the

base bid contract amount.

B. Seasonal Testing

During the Post Construction Phase, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this Contract and are to be included in the base bid Contract amount. The CA and GC shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate subcontractor, with facilities staff and the CA verifying. Any final adjustments to the O&M manuals and as-builts due to the testing shall be made by the responsible Contractor.

3.10 OPERATIONS AND MAINTENANCE MANUAL REQUIREMENTS

- A. The Commissioning process requires detailed record O&M documentation as identified in the Project specifications. Record documentation shall mean O&M information which is sufficiently marked as to indicate exact model and options installed on this Project, as well as a record of as-built final set points, ranges, time delays, and settings. For systems being commissioned, the O&M manuals shall comply with the requirements of this section.
- B. The Contractor shall compile O&M manuals for every piece of equipment and building operating or electrical system being commissioned and as required by the Project specifications with the following format:
 - 1. Quantity: Five complete hard copies and five organized, indexed, and compiled Adobe PDF electronic copies.
 - 2. Format: 8 1/2" x 11" 3-ring loose-leaf binders, 5-inch maximum, and electronic format that is compatible with Owner's system. Each binder shall be clearly labeled on the spine. Use as many binders as required. Do not overload binders. Dividers with permanently marked tabs of card stock shall separate each Section and sub Section. Tab labels shall not be handwritten. A separate manual or chapter shall be provided for each applicable system as follows:
 - a. Boilers and combustion burners
 - b. Pumps
 - c. Air handling units
 - d. Exhaust fans
 - e. Supply air fans (excluding air handling units)
 - f. HVAC terminal devices
 - g. Plumbing and drainage systems/equipment
 - h. Emergency generator systems
 - i. Fire protection systems
 - j. Fire alarm system
 - k. Valves and pipe specialties (include valve identification chart)
 - l. Variable frequency drives (VFD)
 - m. Smoke control systems
 - n. Elevator systems
 - o. Lighting systems and controls (interior and exterior)
 - p. Switchgear, transformers, panel boards, motor control centers and motor starters
 - q. Lightning protection and surge suppression systems
 - r. Building Automation/Temperature Control System
 - s. Fuel system
 - t. Irrigation System
 - u. HVAC testing, adjusting, and balancing
 - v. Other systems as detailed in the drawings and other technical specifications

3. Provide a Title Page and Table of Contents in the front of each binder indicating the content of each binder. The table of contents shall be in sufficient detail as to easily reference and locate each piece of equipment installed. The equipment referenced in the table of contents shall also be declined by indicating the specific unique CMMS identifier used in the Owner's CMMS system. In each binder, there shall be a main tab for each specification Section. Behind the Section number tab, there shall be the equipment ID sub-tab for each piece of major equipment (or group, if small or numerous). These sub- tabs shall be similar to the specification number tabs but of a different color. After each equipment tab shall be the following Sections, in the given order, divided by a double weight colored sheet labeled with the title of the Section.
 - a. Contractor - The first page behind the equipment tab shall contain the name, address and telephone number of the manufacturer and installing Contractor and the 24-hour number for emergency service for all equipment in this Section, identified by equipment.
 - b. Submittal and Product Data - This Section shall include all approved submittal data, cut sheets, data base sheets and appropriate shop drawings. If submittal was not required for approval, descriptive product data shall be included.
 - c. Operation and Maintenance Instructions - These shall be the written manufacturer's data with the model and features of this installation clearly marked and edited to omit reference to products or data not applicable to this installation. This section shall include a system division and an equipment division. The system division will be organized into sections by system and major sub-system. For example, each major fan system will be completely documented in its own section. For each section include the following sub-sections as appropriate:
 - 1) Descriptive Information
 - a) Function or service area served
 - b) Classification
 - c) Design capacity
 - d) Performance characteristics
 - e) Principal components
 - f) Distribution arrangement
 - g) Schematic diagram
 - h) Control diagram
 - i) Commissioning plan
 - j) Results from system functional performance tests
 - k) Equipment list referenced to Equipment Division
 - 2) Operating Instructions
 - a) Starting and stopping procedures
 - b) Adjustment and regulation
 - c) Seasonal changeover
 - d) Seasonal start-up
 - e) Seasonal shutdown
 - f) Logs and records
 - g) Part load performance
 - 3) Control System
 - a) Panel layout sheets
 - b) Point checkout sheets
 - c) As-built control diagrams
 - d) As-built ladder diagrams with hardware interlocks
 - e) Reduced floor plans showing sensor, terminal and panel locations
 - f) Model number, serial number, nameplate data, and location for each piece of equipment and any subcomponent

- C. The equipment division is composed of manufacturers' and fabricators' data on equipment and materials organized into sections by generic classifications of equipment. Within each section organize sub-sections of specific types of equipment. Each section includes the following information for each equipment item as appropriate

1. Descriptive Literature

- a. Catalog cuts, brochures, or shop drawings
- b. Dimensional drawings
- c. Materials of construction
- d. Parts designations

2. Operating Characteristics

- a. Performance tables and charts
- b. Performance curves
- c. Pressure, temperature, and speed limitations
- d. Safety devices

3. Operating Instructions

- a. Pre-start checklists
- b. Start-up checklists
- c. Inspection during operation
- d. Adjustment and regulation
- e. Testing
- f. Detection of malfunction
- g. Precautions
- h. All starting, normal shutdown, emergency shutdown, manual operation and normal and emergency operating procedures and data, including any special limitations.
- i. Step-by-step procedure for system start-up, including a pre-start checklist. Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.
- j. Sequence of Operation, with detailed instruction in proper sequence, for each mode of operation (i.e., day-night; staging of equipment).
- k. Emergency Operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operations (from normal) which the operator can safely follow when there is a partial failure or malfunctioning of components, or other unusual condition.
- l. Shutdown Procedure: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order

4. Inspection Instructions and Procedures

- a. Normal and Abnormal operating temperatures, pressures, and speed limits
- b. Schedule and manner of operation
- c. Detection Signals

5. Maintenance Instructions and Procedures

- a. O&M and installation instructions, system schematics, and one-line diagrams that were shipped with the unit.

- b. Preventative and Corrective Maintenance, with service procedures and schedules:
 - 1) Schedule: Provide a schedule for preventive maintenance in a printed format and an electronic format compatible with Owner's CMMS system. State, preferably in tabular form, the recommended schedule and frequency of performance for each preventive maintenance task, cleaning, inspection and scheduled overhauls or reconditioning.
 - 2) Cleaning: Provide instructions and schedules for all routine cleaning and inspection with recommended cleaning materials and lubricants.
 - 3) Inspection: If periodic inspection of equipment is required for operation, cleaning or other reasons, indicate the items to be inspected and give the inspection criteria for: motors; controls; filters and any other maintenance items.
 - 4) Provide instructions for minor repairs or adjustments required for preventive maintenance routines. Identify test points and give values for each. Include sensor calibration requirements and methods by sensor type.
 - 5) Corrective maintenance instructions shall be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime.
 - 6) Troubleshooting: Troubleshooting tables, charts, or diagrams shall be used to present specified procedures. A guide to this type shall be a three-column chart. The columns shall be titled: Malfunction, Probable Cause and Recommended Action.
 - 7) Repair and Replacement: Indicate repair and replacement procedures most likely to be required in the maintenance of the equipment and list contact information for local suppliers.
 - 8) Calibration: Schedule and procedures for calibration of instruments, controls, and sensors.
 - c. Safety Precautions: This subsection shall comprise a listing of safety precautions and instructions to be followed before, during and after making repairs, adjustments or routine maintenance.
 - d. Manufacturers' brochures (including controls): Manufacturers' descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views and renewal parts lists. Manufacturers' standard brochures and parts list shall be edited so that information applying to the actual installed equipment is clearly defined.
 - e. Supply any special tools required to service or maintain the equipment.
 - f. Performance data, ratings, and curves.
 - g. Warranty and Guarantee, which clearly lists conditions to be maintained to keep warranty in effect and conditions which would affect the validity of the warranty.
 - h. Describe warranty maintenance which will be performed by the installing contractor and include any service contracts issued.
6. Supplemental Data. Prepare written text and/or special drawings to provide necessary information where manufacturer's standard printed data is not available and

information is necessary for a proper understanding and operation and maintenance of equipment or systems, or where it is necessary to provide additional information to supplement data included in the manual or project documents.

7. Control Diagrams/Drawings. Include the as-built control diagrams/drawings for the piece of equipment and its components, including full points list, full print out of all schedules and set points, as built sequences of operation including all final modes of operation, ranges, dead bands, time delays, and settings after testing and acceptance of the system, and copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
8. Specifications. This section is comprised of the component or system specification section copied and inserted complete with all addenda.
9. System Description. This section shall include the individual equipment portion of the overall system Basis of Design document.
10. Warranty
11. Service Contracts
12. Parts List
13. Spare Parts
 - a. Essential Inventory
 - b. Distributor Directory (contacts)

PART 4

4.1 MECHANICAL SYSTEM COMMISSIONING

Note: All checks or procedures in this section are in addition to the pre-function and function checklists distributed by the CA.

- A. This section specifies the unique responsibilities that are a part of, or are related to the commissioning process for the mechanical systems. Mechanical systems include those listed in Part 1 of this Specification Section as being commissioned.
- B. Mechanical Systems Requiring Commissioning
 1. Hot water and refrigerant piping
 2. Ductwork systems and accessories
 3. Exhaust systems
 4. Unit heaters, fin tube radiation, convectors, displacement diffusers, introduction units, duct mounted heating coils and cooling coils.
 5. Pumping systems and accessories
 6. Rooftop units, heating and ventilating units, and unit ventilators
 7. Heat recovery units
 8. Boilers, burners, and related controls
 9. Split systems air conditioning systems including Variable Refrigerant Flow (VRF) heat pump systems
 10. Ventilation fans, power and gravity ventilation
 11. Chemical treatment systems including glycol charge

12. Automatic Temperature Controls (ATC), Building Automation System (BAS) and stand-alone controls on packaged equipment.
 13. Safety devices
 14. Instrumentation, meters, and gages
 15. Testing, adjusting, and balancing of HVAC systems
 16. Tail pipe exhaust
 17. Kitchen exhaust and make-up air system.
- C. The test requirements listed in this section do not release the subcontractor from the obligation to perform all other appropriate, industry standard, manufacturer-recommend or code-required checks and tests. The following list is a minimum requirement:
1. ASHRAE Guideline 1.1-2007 The HVAC Commissioning Process
 2. NEBB
 3. SMACNA
- D. The following common acceptance criteria apply to all electrical equipment, assemblies and features related to mechanical systems:
1. For the conditions, sequences and modes tested, the equipment, integral components and related equipment shall perform as expected and respond as expected to varying loads and changing conditions and parameters appropriately as expected, according to the sequences of operation, as specified, according to acceptable operating practice and the manufacturer's performance specifications. Verify that equipment operates within tolerances specified in: governing codes, acceptance criteria contained in the construction documents, manufacturer's literature and according to good operating practice.
 2. Systems shall accomplish their intended function and performance.
 3. Resetting a manual safety shall result in a stable, safe, and predictable return to normal operation by the system.
 4. Safety circuits and permissive control circuits shall function in all possible combinations of selector-switch positions (hand, auto, inverter, bypass, etc.).
 5. Other acceptance criteria are given in the equipment testing requirements articles or referenced standards.
 6. Additional acceptance criteria will be developed by the CA when detailed test procedures are developed. See specification section 01810-3.8 for additional criteria
- 4.2 BOILERS AND BURNERS
- A. Verify installation meets design requirements.
 - B. Confirm proper operation of safety relief devices.
 - C. Confirm proper operation of control panels and interface to BAS.
 - D. Verify integrity of control device installation in control panels.
 - E. Verify proper low/high cut out, flame safety, and gas train safety devices operation.
 - F. Confirm proper automatic start up and normal automatic shutdown.

- G. Verify intended sequencing of boilers in response to load changes and variable hot water demand for each boiler while it is in the heating operation mode as well as while it is in the domestic hot water service mode. Confirm proper operation under light load and water flow rates.
- H. Confirm proper firing rates of boilers.
- I. Confirm proper gas train controls and gas vent piping
- J. Confirm proper feed water pump operation (if applicable.)
- K. Simulate power loss/power return and confirm restart automatically of plant to confirm proper operation and alarming.
- L. Test (simulate) all alarm functions. Verify proper interface and all mapped over points from the chiller controller with Building Automation System (BAS).
- M. Confirm relays and other devices are rated for operation cycling to be experienced especially light loading situations.
- N. Confirm results of combustion tests on each boiler running individually and in combination with each other at 1/3, 2/3, and full firing rates. Record and submit all information results indicating the system firing has been optimized for efficiency.
- O. Submit manufacturer's startup results data.
- P. Demonstrate manual blow down operation.
- Q. Demonstrate maintenance required and provide manufacturers training including seasonal start-up and lay-up.
- R. Verify proper installation of breeching and setting of draft.
- S. Verify proper operation of makeup air intake system; confirm that the mechanical room is under negative pressure and all modes of operation while any one boiler is operational. Test the space and adjacent space for CO.
- T. Verify proper relief venting, proper rating sizing of relief valves, and that discharge pipes are properly installed.
- U. Confirm all piping is properly supported and has necessary vibration isolation and seismic bracing per design.
- V. Confirm proper draining and treatment of combustion condensate.
- W. Provide written documentation of all of the commissioning and start-up tests
- X. Demonstrate maintenance required and training.

4.3 HOT WATER HEATING DISTRIBUTION SYSTEM

- A. Confirm proper system flush out, cleaning, and water treatment prior to circulating water through coils and the boilers. Confirm operation of all circulation pumps. Verify balancing report is accurate; verify proper rotation direction, inlet/outlet pressures, flow rates, motor electrical power.
- B. Demonstrate normal power failure/emergency power start of all circulation pumps.

- C. Confirm interface of temperature, flow pressure and status points with BAS.
 - D. Confirm proper operation of all heating valves, reheat coil valves, etc.
 - E. Verify proper operation of variable frequency drives on pump motors, minimum bypass valves and pressure differential flow stations.
 - F. Confirm all balancing completed.
 - G. Confirm all insulation is installed as specified, properly identified, valves tagged, and devices labeled.
 - H. Confirm all piping is properly supported and has necessary vibration isolation and seismic bracing per design.
 - I. Confirm proper flow direction.
 - J. Confirm proper venting, filtration, and water treatment.
 - K. Verify loop temperatures. Record inlets and outlet temperatures of all coils.
 - L. Demonstrate pump maintenance procedures and training.
- 4.4 AIR HANDLING SYSTEMS (APPLICABLE FOR EACH SYSTEM)
- A. Verify readings of AHU controls and all mapped over points from the AHU controller and points mapped over from variable frequency drives/AHU controller to readings obtained on the BAS.
 - B. Verify balancing report is accurate
 - C. Check filter status switch. Install clean filters at the end of construction.
 - D. Confirm damper operation. Confirm minimum ventilation settings. Ensure dampers operate freely and sufficient damper motors are provided.
 - E. Verify dampers seal tight when closed.
 - F. Ensure ductwork and air handling units are clean and washed down prior to final acceptance. Confirm condensate pumps and pans are clean and draining properly.
 - G. Verify fan systems capacity control. Measure static pressures at various flow settings of fan.
Confirm system is stable when operating.
 - H. Confirm proper heating and cooling coil operation. Measure inlet/outlet temperatures.
 - I. Confirm suitable drain traps provided. Verify trap height and system static pressures.
 - J. Confirm fire alarm and safety devices in place and fully functional.
 - K. Confirm operation of all interior lights for the unit.
 - L. Measure for belt tension and confirm it is within manufacturer's recommendation.
 - M. Verify air system balance and confirm it is within tolerance.
 - N. Verify bearing lubrication works correctly. Record bearing lubrication activities from start up to final turn over to Owner.

- O. Verify filters fit tight with minimal air leakage.
- P. Verify ease of accessibility for maintenance.
- Q. Confirm the unit and all connecting ductwork is properly supported and has necessary vibration isolation and seismic bracing per design.
- R. Confirm capacity control for fan operation.
- S. Demonstrate maintenance required and training

4.5 FANS

- A. Confirm correct installation as per manufacturer's instructions.
- B. Confirm correct rotation.
- C. Confirm all fans and connecting ductwork is properly supported and has necessary vibration isolation and seismic bracing per design.
- D. Measure and record motor amperage
- E. Verify (if applicable) belt tension.
- F. Verify bearings are lubricated.
- G. Record lubrication from startup to final turn over to Owner.
- H. Verify no vibration exists.
- I. Confirm balancing complete; verify results.
- J. Demonstrate maintenance required and training

4.6 PACKAGED RTU's

- A. Verify readings of RTU's controls and all mapped over points from the RTU's controller and points mapped over from variable frequency drives/RTU controller to readings obtained on the BAS.
- B. Submit manufacturer's startup results data.
- C. Verify balancing report is accurate
- D. Check filter status switch. Install clean filters at the end of construction.
- E. Confirm damper operation. Confirm minimum ventilation settings and economizer operation. Ensure dampers operate freely and sufficient damper motors are provided.
- F. Verify dampers seal tight when closed.
- G. Ensure units are clean and washed down prior to final acceptance.
- H. Confirm the unit and all connecting ductwork is properly supported and has necessary vibration isolation and seismic bracing per design.

- I. Verify fan systems capacity control. Measure static pressures at various flow settings of fan. Confirm system is stable when operating.
- J. Confirm proper heating and cooling operation, including the gas furnaces, cooling coils, heat wheels, condensers etc...Confirm that simultaneous heating and cooling is not occurring and that the equipment is operating as efficiently as possible.
- K. Confirm condensate pans are clean and draining properly. Confirm suitable drain traps provided. Verify trap height and system static pressures.
- L. Confirm fire alarm and safety devices in place and fully functional.
- M. Confirm operation of all interior lights for the unit.
- N. Measure for belt tension and confirm it is within manufacturer's recommendation.
- O. Verify air system balance and confirm it is within tolerance.
- P. Verify bearing lubrication works correctly. Record bearing lubrication activities from start up to final turn over to Owner.
- Q. Verify filters fit tight with minimal air leakage.
- R. Verify ease of accessibility for maintenance.
- S. Confirm capacity control for fan operation.
- T. Observe operation of system capacity control.
- U. Verify proper sequencing of compressors and condenser fan system.
- V. Confirm proper operating charge and operating pressures of refrigerant system.
- W. Simulate system shutdown upon alarm detection. Confirm signals sent to BAS and response observed.
- X. Demonstrate maintenance required and training

4.7 MECHANICAL SUBCONTRACTOR' TAB RELATED RESPONSIBILITIES

- A. Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.
- B. Including cost of sheaves and belts that may be required by TAB.
- C. Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. Providing an approved plug.
- D. Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.
- E. Install a spare P/T plug at each water sensor that is an input point to the control system in order to facilitate calibration checks.
- F. List and clearly identify on the as-built drawings the locations of all flow stations, and

balancing/calibration devices.

- G. Prepare a preliminary schedule for Division 15 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the CA. Update the schedule as appropriate.
- H. Notify the GC or CA, depending on protocol, 5 working days prior to the time scheduled when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and TAB will occur. Be responsible to notify the GC or CA, ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction. Be proactive in seeing that commissioning processes are executed and that the CA has the scheduling information needed to efficiently execute the commissioning process.

4.8 TAB CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

- A. Six weeks prior to starting TAB, submit to the CA the qualifications of the site technician for the project, including the name of the Contractors and facility managers of recent projects the technician on which was lead. The CA will approve the site technician's qualifications for this project.
- B. During construction visits to the site to observe construction at least three times per phase to review construction progress and review the systems installation to determine if there are any adverse conditions which will impede accurate and effective TAB. Provide written reports of site visits and identify any issues which should be addressed by the contractors.
- C. Six weeks prior to starting TAB, submit an outline of the TAB plan and approach for each system and component to the CA, GC and the controls Contractor. This plan will be developed after the TAB has some familiarity with the control system.
- D. The submitted plan will include:
 - 1. Certification that the TAB Contractor has reviewed the construction documents and the systems with the design engineers and Contractors to sufficiently understand the design intent for each system.
 - 2. An explanation of the intended use of the building control system. The controls Contractor will comment on feasibility of the plan.
 - 3. All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - 4. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - 5. Final test report forms to be used.
 - 6. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch/sub-main proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using airflow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the waterside.
 - 7. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - 8. Details of how total flow will be determined.
 - 9. The identification and types of measurement instruments to be used and their most recent calibration date.
 - 10. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.

11. Confirmation that TAB understands the outside air ventilation criteria under all conditions.
 12. Details of whether and how minimum outside air CFM will be verified and set and for a specific level (total building, zone, etc.).
 13. Details of how building static and exhaust fan/relief damper capacity will be checked.
 14. Details of methods for making any specified coil or other system plant capacity measurements.
 15. Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
 16. Details regarding specified deferred or seasonal TAB work.
 17. Details of any specified false loading of systems to complete TAB work.
 18. Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 19. Details of any required interstitial cavity differential pressure measurements and calculations.
 20. Draft of field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 21. Draft of formal progress reports (scope and frequency).
- E. A running log of events and issues shall be kept by the TAB field technicians. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and GC at least twice a week.
- F. Communicate in writing to the controls Contractor all set point and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
- G. TAB procedures shall be in strict accordance with either Associated Air Balance Council (AABC) National Standards for Total System Balancing 6th edition 2002 or National Environmental Balancing Bureau (NEBB) Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, 7th edition, 2005. A copy of the chosen standard shall be kept at the job site along with a copy of the TAB Plan book specified herein. As work is completed, this TAB book shall be updated with pertinent field reports, sketches, flow diagrams, etc. At the project closeout, this record document shall be submitted in draft form for Owner and Engineer review and approval. Provide five copies of the draft TAB report within two weeks of completion for review. Take corrective actions requested by the engineer and/or CA, modify report and resubmit.
- H. Provide the CA with any requested data, gathered, but not shown on the draft reports.
- I. Provide a final TAB report for the CA with details, as in the draft.
- J. Variable frequency drives shall be tested and documented on the associated fan or pump curve at a minimum of four separate flow conditions to simulate design diversity.
- K. Flows shall be checked in all duct and pipe main risers and branches in addition to at equipment and terminal devices. All flows shall be recorded before and after each adjustment.
- L. Where specific water systems require special or additional procedures for testing and balancing, such procedures shall be in accordance with the TAB Plan. If a system has diversity, only the required quantity of wide-open terminals shall be used to meet the design flow.
- M. Final settings of all HVAC adjustment devices including valves, splitters, and dampers shall be permanently marked by the TAB firm so that adjustment can be restored if disturbed at

any time.

- N. The testing and balancing contractor shall permanently and legibly mark and identify the location points of the duct test ports as well as document ports on TAB Plan system flow diagrams. If the ductwork has exterior insulation, these markings shall additionally be made on the exterior side of the ductwork insulation. All penetrations through ductwork and ductwork insulation shall be properly sealed to prevent air leakage or loss of vapor barrier.
- O. As part of the TAB report provide a system schematic which includes a static pressure profile depicting all pressure drops throughout the AHU's.
- P. Include all final BAS setpoint signals to all VFD's correlated to damper positions and system pressures/flow rates.
- Q. Testing, adjusting, and balancing of the systems shall be coordinated with the automatic temperature control system (ATC) installation. All control components shall be verified and documented by the ATC contractor to be properly installed and operating as specified before proceeding with testing, adjusting, and balancing. Documentation by the ATC contractor shall be with their point-to-point checklists and quality assurance documents. TAB firm shall follow applicable TAB Plan standards in completing their work. Adjustment of the temperature controls shall be coordinated by the person in charge of the balancing and adjusting and shall be performed coincidental therewith. In conjunction with the ATC contractor simulate a complete cycle of operation for each system using the CA's functional performance test narratives as a dry run to the Contractor's system demonstration to the CA.
- R. A draft of the Final Report shall be submitted prior to the Contractor's system demonstration to the CA. After the deferred, seasonal testing, adjusting, and balancing and Contractor's system demonstration to the CA, a Final TAB Report shall be submitted

PART 5

5.1 AUTOMATIC TEMPERATURE CONTROL CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

The following requirements are commissioning-related and are considered to be in addition to the requirements for controls as specified in the applicable Section:

Note: All checks or procedures in this section are in addition to the pre-functional and function checklists distributed by the CA.

- A. Control System Narrative: A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system. The sequences shall be accompanied by a detailed description of the specific control logic which is being programmed into the system including all reset schedules, dead bands, PID loop parameters, ranges, time delays, safety routines, system interlocks and integration points referencing other control routines, etc...The end result of this is a document which describes not only the sequence, but also a description of how the programming implements the sequence and documents initial set points which will then be updated during as-built documentation.
- B. Points List: A point/object list for each system controller including inputs and outputs (I/O), point/object number, the controlled device associated with the I/O point/object, and the location of the I/O device. Software flag points/objects, alarm points/objects, etc.
- C. Testing Procedure: A description of the proposed process along with all report formats and checklists to be used in Control System Demonstration and Acceptance.

- D. A BACnet Protocol Implementation Conformance Statement (PICS) for each type of controller and Operator Workstation included in the submittal. PICS to include for each product, as a minimum, a list of BACnet functional groups supported, BACnet services supported, BACnet data link options available and BACnet objects provided.
- E. The manufacturer's manual or data sheets fully covering installation, operation, and maintenance of the equipment, including control diagrams and parts lists for components and systems which are modified or installed as part of this project.
- F. The contractor shall provide a project Commissioning Plan including point to point checkout procedures, hardware and software pre-functional checkout procedures, functional testing procedures, trend log plan, and documentation proposed to be used in submitting the results of these start up checks. The plan shall include a project schedule which describes the commissioning work. This plan shall describe the contractor's implementation procedures in detail and shall include a description of the testing equipment being used including its calibration history.
- G. Provide an operating manual to serve as training and reference manual for all aspects of day-to-day operation of the system. Include as a minimum:
 - 1. Control flow diagrams for all building systems for components and systems which are modified or installed as part of this project.
 - 2. Sequence of operation for automatic and manual operating modes for all building systems which are modified or installed as part of this project. The sequences shall cross-reference the system point names.
 - 3. BAS system manufacturers complete operating manuals for components and systems which are modified or installed as part of this project.
 - 4. Provide a maintenance manual to serve as training and reference manual for all aspects of day to-day maintenance and major system repairs. Include as a minimum:
 - a. Complete controls as-built installation drawings for each system which is modified or installed as part of this project.
 - b. A list of all sensors and instrumentation with recommended calibration procedures and frequency of calibration events.
 - c. Recommended maintenance procedures for all control panels, servers, and battery back-ups including frequency of maintenance events.
 - 5. Overall system electrical power supply scheme indicating source of electrical power for each system component for components and systems which are installed as part of this project. Indicate all battery backup provisions.
 - 6. Drawings showing installation details and locations of equipment for components and systems which are installed as part of this project.
 - 7. Routine preventive maintenance procedures, corrective diagnostics troubleshooting procedures which are installed as part of this project.
 - 8. Parts list with manufacturer's catalog numbers and ordering information for components and systems which are modified or installed as part of this project.
 - 9. Field test reports.
 - 10. Provide a programming manual to serve as training and reference manual for all aspects of system programming for components and systems which are modified or installed as part of this project. Include as a minimum include the following:
 - a. Complete programming manuals and reference guides.
 - b. Details of any special software packages and compilers supplied with system.
 - c. Information required for independent programming of system.
 - d. Point schedule including all points, real and virtual.
 - e. Project specific software troubleshooting procedures.

- H. As-built records for components and systems which are modified or installed as part of this project shall be delivered at least 5 days prior to substantial completion (5 sets hard copy, 5 sets electronic). The documents shall be submitted for approval prior to final completion as specified in the respective section and additionally the following shall be included:
1. Project Record Drawings. These shall be as-built versions of the controls submittals with details regarding final settings and programming parameters recorded as built. One set of electronic as-builts including CAD drawing files also shall be provided.
 2. Testing and Commissioning Reports and Checklists. Completed versions of all reports and checklists, along with all trend logs, used to meet the commissioning requirements described elsewhere in this specification.
 3. As-built versions of the system hardware and software - Include all as-builts programming logic, including final schedules, set points, off-sets, delays, ranges, dead bands, virtual points, interlocks, etc. As-built records of the sequence alone are not adequate records. The programming shall be presented in a detailed fashion such that the owner understands not only what the controls are intended to do, but how they are programmed to do it.
 4. Operations and Maintenance (O&M) Manual - This shall include as-built versions of the submittal product data. In addition to the information required for submittals, the O&M manual shall include the following items:
 - a. Names, addresses, and 24-hour telephone numbers of Contractors installing equipment, and the control systems and service representatives of each.
 - b. Operators Manual with procedures for operating the control systems, including logging on/off, alarm handling, producing point/object reports, trending data, overriding computer control, and changing set points and other variables.
 - c. One set of Programming Manuals with a description of the programming language (including syntax), statement descriptions (including algorithms and calculations used), point/object database creation and modification, program creation and modification, and use of the editor.
 - d. Engineering, Installation, and Maintenance Manual(s) that explain how to design and install new points/objects, panels, and other hardware; preventive maintenance and calibration procedures; how to debug hardware problems; and how to repair or replace hardware.
 - e. A listing and documentation of all custom software created using the programming language, including the setpoints, tuning parameters, and object database. One set of CD/DVDs containing files of the software and database also shall be provided.
 - f. One set of electronic files of all color graphic screens created for the project.
 - g. A list of recommended spare parts with part numbers and suppliers.
 - h. Complete original-issue documentation, installation, and maintenance information for all third-party hardware provided, including computer equipment and sensors.
 - i. Complete original-issue CD/DVDs for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
 - j. System Security Software Lock Key: The system software lock key associated with any operator work station shall be turned over to the owner.
 - k. Licenses, guarantee, and warranty documents for all equipment and systems.
 - l. Recommended preventive maintenance procedures for all system components, including a schedule of tasks (inspection, cleaning, calibration, etc.), time between tasks, and task descriptions.

- m. Final Commissioning Report (results) including record screen shots, trend log results (in electronic format), point to point check out, calibration results, pre-functional and functional testing results, recommended continuous commissioning and maintenance procedures and any deficiencies recommended for future remediation.
 - n. Training materials, software, software licenses, and programming back-up.
 - o. Guarantees and warranties.
 - p. Continuous commissioning plan including activities frequency and schedule.
 - q. A written maintenance procedure plan and timeline for activity during the first year of warranty maintenance.
- I. Training Manuals: The Contractor shall provide a course outline and training manuals for all training classes at least six weeks prior to the first class. The Engineer may modify any or all of the training course outline and training materials to meet the needs of the Owner. Review and approval by the Engineer shall be completed at least three weeks prior to the first class.
 - J. Non-Proprietary Software: A letter from the control manufacturer to the owner stating that the operating software is free from any licensing or other restrictions that would prohibit any service provider approved by the owner to service the system with non-proprietary software and tools and without the necessity of gaining approval from the manufacturer.

5.2 BAS TREND LOGS, ENERGY REPORTING, AND CONTINUOUS COMMISSIONING

Note: All checks or procedures in this section are in addition to the pre-function and function checklists distributed by the CA.

- A. In addition to the start-up, testing and commissioning specified in the applicable section and the following shall apply:
- B. Trending, energy reporting and ongoing continual commissioning BAS software:
 - 1. Real Time Trends:
 - a. Initiate a real time trending instance of all system points simultaneously in time-stamped intervals between 5 and 15 minutes.
 - b. Logically group trended points for each system and include global information such as outside temperature, humidity, and calculated virtual points.
 - c. System shall have the capability to group trending data by areas of the building to compare usage, as deemed appropriate by owner and CA.
 - d. System shall automatically archive trends on an adjustable time period.
 - e. The server hardware shall be capable of storing 12 months of archived trend data of all points in the system.
 - f. Meet with CA to discuss trend grouping and format prior to setting up trend logs.
 - 2. Historical Data Collection:
 - a. Historical trend data shall be collected by field level devices and periodically uploaded to the data server.
 - b. Initiation of historical data collection shall be configurable as follows:
 - 1) By manual operator intervention in a point and click manner.
 - 2) By a user-adjustable time-schedule or date.
 - a) Triggered by a binary status variable (when the fan status is on, start the trend of the mixed air temperature).
 - b) The system shall be capable of trending any and all variables in this system.

- c. The status and capacity of the trend logs in the field devices shall be viewable from the operator workstation.

3. Energy Reporting:

- a. Display the real-time usage from utility-grade pulse meters for all major fuel sources within the building (electricity, gas, water) on the Building Automation System home screen. Display shall show the current value relative to the minimum, maximum, and median values (for example in a "speedometer" style graphic). Min/max/median values shall be based on the data for a moving 12- month time window.
- b. Create an energy management tool which tracks the following information. The intent is to either meter or calculate the energy consumption of all major fuel sources within the building and to display the information in a manner which can be quickly interpreted by building operators.
 - 1) Monitor and trend electricity, water, and natural gas consumption in real time.
 - 2) 15-minute interval demand and consumption - summarize hourly, daily, monthly, and annually.
 - 3) Track minimum, maximum, and average per period demand and consumption (totalize consumption).
 - 4) Tabulate data and provide comparisons including but not limited to:
 - a) Current day's usage (kWh - electric, ccf - gas/water) relative to previous day.
 - b) Current month's (MTD) usage relative to previous month,
 - c) Current year's usage (YTD) relative to previous year,
 - d) Monthly peak demands (kW - electric, cfm - gas/water) stored for current month plus previous twelve (12) months.
 - 5) The report shall include graphs which illustrate the tabulated data by fuel type. For example: bar graphs showing current month usage along with each of the previous 12 months' usage, line graphs showing current month peak demand along with each of the previous 12 months' peak demands.
 - 6) The report shall automatically calculate and totalize heating and cooling degree days on a monthly basis to be stored with each month's energy usage data.
 - 7) The analysis function shall allow the owner to input different normalization parameters which will allow the energy data to be multiplied or divided by other statistical data such as facility square footage and heating/cooling degree days.
 - a) The system graphics shall include an energy reporting graphic which shall display the current real time energy consumption statistics of all major end uses, as well as major utility meters.
 - b) The system graphics shall also include a graphic displaying the equivalent emissions reductions from each type of energy consumption (electricity, gas, etc.)

- c) The system shall have the capacity to display energy consumption in kWh, Btu, metric tons of CO2 emissions, or dollars spent.
 - d) The contractor shall meet with the Owner and CA prior to programming the energy consumption reporting strategies in order to present and review the proposed calculations and programming concepts.
4. Demand Response (demand-limiting and load-reduction software):
- a. The contractor shall program the controls system to automatically alarm and notify the operator when any of the utility systems being monitored are within 15% of a previous peak or exceed a user definable value.
 - b. The software shall have four levels of automatic load reduction strategies including but not limited to:
 - 1) Shutting off or limiting the demand of selective loads,
 - 2) Reducing flow in variable flow systems,
 - 3) Changing space temperature set points,
 - 4) Signaling other control devices such as lighting controllers, etc.
 - c. The load reduction strategies may be user enabled or disabled and may vary from summer to winter. The contractor shall meet with Owner and Engineer prior to programming the load reduction strategies in order to present and review the programming concepts.
 - d. Load-reduction strategies shall be enabled and disabled via the Home Screen on the Building Automation System front end display.
5. Continuous Commissioning Programs - The contractor shall provide continuous commissioning subroutines for all control objects and systems provided as part of this contract. This shall include but not be limited to the follow example routines:
- a. Hot Water: CCx function- relative calibration check on supply and return sensors- Periodically during unoccupied period when the weather is above 60 degrees and the heating boilers are off, and start pumps for a 1 hr period , after which if supply and return sensors read more than 4 degrees difference for more than 30 minutes, alarm.
 - b. Min Flow By-pass valve: CCx function- Operation of valve-if minimum bypass valve is open(not closed) for more than 30 mins consecutive or 60 minutes in a consecutive 24 hr period, alarm.
 - c. AHU Exhaust Fan Air Flow stations: CCx function-Flow station calibration- if exhaust exceeds outside air flow rate by more 10 % of the design difference for more than 30 minutes, alarm.
 - d. Outside Air Flow stations: CCx function - Flow station calibration - if flow differs from set point by more than 15 % for more than a one hour period, alarm CCx function- Flow station relative calibration check. Periodically close the mixed air damper, open the outside air dampers fully, reduce the supply fan to minimum flow, open the exhaust air damper fully, ramp exhaust fan to minimum (based on the design differential between supply and return, and compare the supply and exhaust air flows. If the flow rates are more than +/- 10% of their respective design values, alarm. After calibration check restore to normal operation.
 - e. AHU Temp Sensor Relative Calibration check: CCx function- Periodically when the unit is in the unoccupied mode, and outside air is greater than 50 degrees and less than 75 degrees close outside air dampers, open mixed air damper (full return), shut off heating and cooling. Allow unit temperatures to stabilize for 15 minutes

(adjustable) and compare all temperature sensors to each other. If any sensor reads more than 4 degrees different from another (compensate for return and supply air energy), alarm. After calibration check restore to normal operation.

- f. Heat Wheel Operational Check: If at any time when the outside air conditions are acceptable for airside economizer free cooling and the heat wheel recovers and transfers enough energy from the exhaust airstream to the supply airstream to cause the mechanical cooling to run for more than 15 minutes, alarm.
- g. Mixed Air Damper Closure (return damper): CCx function- Periodically when the outside air is less 60 degrees but greater than 40 close mixed (return) air dampers. If the mixed air reads more than 4 degrees above the outside air temperature, alarm.

5.3 CONTROL SYSTEM CHECKOUT AND TESTING

- A. Start-up Testing: All testing listed in this article shall be performed by the Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner's Representative is notified of the system demonstration.

1. The Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.
2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
3. Verify calibration of all input devices individually using handheld testing devices. Perform calibration procedures per manufacturers' recommendations.
4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.
5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The Contractor shall check all control valves and automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum Start/Stop routines.
7. Confirm that all graphics are complete and display information real time and consistently from screen to screen.
8. Alarms and Interlocks:
 - a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm
 - b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
 - c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

5.4 FIELD I/O CALIBRATION AND COMMISSIONING

- A. Verify that each control panel has been installed according to plans, specifications and approved shop drawings.

- B. Calibrate, test, and have signed off each control sensor and device.
- C. Commissioning to include documenting conformance with project and specification intent for, but not be limited to:
 - 1. Sensor accuracy calibration at 10, 50 and 90% of range.
 - 2. Sensor range.
 - 3. Verify analog limit and binary alarm reporting.
 - 4. Point value reporting.
 - 5. Binary alarm and switch settings.
 - 6. Actuator and positioner spring ranges if pneumatic actuation is utilized.
 - 7. Fail safe operation on loss of control signal, pneumatic air, electric power, network communications, etc.
 - 8. Verification of proper sequence of operation under varying operating conditions.
 - 9. PID Loop Tuning
 - 10. Checking and optimizing performance by adjusting dead bands, ranges, reset schedules, delays and calibration factors.
- D. System Commissioning
 - 1. Each BAS program shall be put online and commissioned. The contractor shall, in the presence of the CA, demonstrate each programmed sequence of operation and compare the results in writing. In addition, each control loop shall be tested to verify proper response and stable control, within specified accuracy. System program test results shall be recorded on commissioning data sheets and submitted for record. Contractor shall submit proposed functional testing procedures and documentation sheets to the commissioning agent for review and approval prior to starting functional testing. Any discrepancies between the specification and the actual performance will be immediately rectified and re-tested.
- E. Integrated System Program Commissioning – Functionally test all components and systems at the turnover of each phase and again as one integrated system before final acceptance of the project.
 - 1. Tests shall include, but not be limited to:
 - a. Data communication, both normal and failure modes.
 - b. Fully loaded system response time.
 - c. Impact of component failures on system performance and system operation.
 - d. Time/Date changes.
 - e. End of month/ end of year operation.
 - f. Season changeover.
 - g. Global application programs and point sharing.
 - h. System backup and reloading.

- i. System status displays.
 - j. Diagnostic functions.
 - k. Power failure and restoration routines.
 - l. Battery backup.
2. Test procedure and documentation shall be as follows:
- a. Submit for approval, a detailed acceptance test procedure designed to demonstrate compliance with contractual requirements. This Functional Acceptance test procedure will take place after the commissioning procedure but before final acceptance, to verify that all systems and equipment including those previously commissioned in early phases, are working properly, individually and as one entire integrated system
 - b. Using the commissioning test data sheets, the contractor shall demonstrate the operation of each point. The contractor shall also demonstrate 100 percent of the system functions. The contractor shall demonstrate all points and system functions until all devices and functions operate smoothly, efficiently, and automatically and meet specification and intended sequence of operation throughout all seasons.
 - c. The BAS contractor shall supply all instruments for testing.
 - d. All test instruments shall be submitted for approval prior to their use in commissioning.
 - e. Test Instrument Accuracy:
 - 1) Temperature: $\frac{1}{4}^{\circ}\text{F}$ or $\frac{1}{2}\%$ full scale; whichever is less.
 - 2) High Pressure (PSI): $\frac{1}{2}$ PSI or $\frac{1}{2}\%$ full scale, whichever is less.
 - 3) Low Pressure: $\frac{1}{2}\%$ of full scale (in w.c.)
 - 4) Humidity: 2% RH
 - 5) Electrical: $\frac{1}{4}\%$ full scale
 - 6) CO₂ and CO: +/- 5%
3. After the above tests are complete and the system is demonstrated to be functioning as specified, a thirty-day performance test period shall begin. If the system performs as specified throughout the test period, requiring only routine maintenance, the system shall be accepted. The contractor shall provide logically grouped time stamped trend logs of 15-minute interval data in Excel format with common English headers and point descriptors. These trend logs will be evaluated by the commissioning agent and deficiencies discussed with the contractor. Deficiencies shall be corrected and the system performance test shall be repeated. If the system fails during the test, and cannot be fully corrected within sixteen hours, the owner may request that the performance test period be restarted. Final acceptance will not occur until the CA has accepted and approved successful performance as evidenced by the trend logs.

5.5 CALIBRATION SERVICES FOR ALL POINTS-

Note: Manufacturers Recommended procedures should take precedence over the following

calibration procedures:

- A. RTD (Resistance Temperature Detectors):
 - 1. Check with voltmeter for correct power at the sensor.
 - 2. Open low voltage side of the RTD to verify correct location.
 - 3. Reconnect circuit, then using digital thermometer compare to the reading on the operator workstation.
 - 4. Record deviations on commissioning sheet under comment area.
- B. Humidity Sensors (analog input) will be inspected for secure and proper installation.
 - 1. Check with voltmeter for correct power at the sensor.
 - 2. Open low voltage side of the humidity sensor to verify correct location.
 - 3. Reconnect circuit, then using a hand held electronic humidity sensor compare to the reading on the operator workstation.
 - 4. Record deviations on commissioning sheet under comment area.
- C. Pressure Transmitters (analog input) will be inspected for secure and proper installation.
 - 1. Verify static pressure probes are located in the correct location and input wires are terminated to correct input.
 - 2. Disconnect both high and low side of the transducer and check for "0" reading at the operator workstation.
 - 3. Attach with a brass tee a Magnehelic or manometer to high side port of the transmitter.
 - 4. Verify range of transmitter is correct at user workstation.
 - 5. Slowly increase pressure on the transmitter by opening the fan inlet vanes or increasing the output signal to the VFD (Variable Frequency Drive) and compare to the reading on the operator workstation. Repeat this step for various points of the transmitter span.
 - 6. Record deviations on commissioning sheet under comment area.
 - 7. For devices which are factory calibrated. If further calibration is necessary span and zero adjust may be changed and step "d" must be repeated.
- D. Velocity Measurement (Using Pressure Transmitters) (analog input) will be inspected for secure and proper installation.
 - 1. Verify static and total pressure probes are located in the correct location and input wires are terminated to correct input.
 - 2. Disconnect both high and low side of the transducer and check for "0" reading at the operator workstation.
 - 3. Attach with a brass tee a Magnehelic or manometer to high and low ports of the transmitter. Magnehelic has to be of the appropriate range. A hot wire anemometer can also be used.
 - 4. Verify range of transmitter is correct at user workstation.

5. Slowly increase pressure on the transmitter by increasing the output signal to the VFD [Variable Frequency Drive] and compare to the reading on the operator workstation, some conversions may be required. Repeat this step for various points of the transmitter span.
 6. Record deviations on commissioning sheet under comment area.
- E. Flow Stations:
1. Work with the TAB contractor and calibrate all flow stations to know flow rates as measured by the TAB contractor.
- F. Current Sensor (analog input) will be inspected for secure and proper installation.
1. Check the full load amperage of the device being measured. Enter range into the input at the front end. Example: Fan FLA is 36 amps, enter 0 - 40 amps in the range.
 2. If possible, put the device being sensed at 100% load. Example: Put the fan at 100% speed.
 3. Measure the amperage at the same leg of power as the current sensor with an amp meter. Verify Current sensor is installed on the load side of the starter or VFD.
 4. Compare amp meter reading with the amp reading from input at the front end.
 5. Adjust the potentiometer on the current sensor until both readings (the amp meter and the front end) are the same.
 6. If the readings do not match, check the input reference resistor on the controller (make sure it is set to out) and that the polarity is the same at both the controller and the current sensor.
 7. Note: Reference input voltage/resistor should be out for any devices that are loop powered externally, such 4-20ma inputs, 0-10 volts, etc., and should be in for dry contact status, and thermistors where the reference voltage generated by the controller input is required.
- 5.6 CONTROL SYSTEM DEMONSTRATION
- A. Demonstration
1. Prior to acceptance, the control system shall undergo a series of pre-functional checkout verification and functional performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed its own tests
 2. The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process and as specified. The CA will be present to observe and review these tests. The CA shall be notified at least 10 days in advance of the start of the testing procedures.
 3. The approved checklists and forms shall be completed for all systems as part of the demonstration
 4. The Contractor shall provide at least two persons equipped with two-way communication, and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point/object and system. All test equipment required to prove the proper operation shall be provided by and operated by the Contractor.
 5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, expected reading, actual reading, final setting and any corrective action taken or needed.
 6. Demonstrate compliance with Sequences of Operation through all modes of operation

7. Demonstrate complete operation of Operator Workstation including trending, archiving, printing, and security functions are working as intended
8. Demonstrate loss of power and successful cold restart.
9. Additionally, the following items shall be demonstrated:
 - a. DDC Loop Response. The Contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in setpoint, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the setpoint, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
 - b. Demand limiting. The Contractor shall supply a trend data output showing the action of the demand-limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 120-minute period. Included in the trend shall be building kW, demand limiting setpoint, and the status of shed-able equipment outputs.
 - c. Optimum Start/Stop. The Contractor shall supply a trend data output showing the capability of the algorithm. The hour-by-hour trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas
 - d. Reset Control: The contractor shall demonstrate that the reset of temperature, static pressure, and differential setpoints are properly adjusting up and down as intended.
 - e. Time of Day: The contractor shall demonstrate that the time of day scheduling functions have been programmed and are working as intended.
 - f. Variable Flow: The contractor shall demonstrate that the air and water systems which are intended to vary flow rates according to actual demand have been programmed and are working as intended. Confirm that the actual flow readings have been calibrated. Confirm that the actual pressure setpoints have been tested and are set to be no more than 10% higher than the minimum needed to meet the worst case system pressure drop. Record min and max VFD setpoints
 - g. Safe Shutdown and Restart: The contractor shall demonstrate that upon a loss of power, the DDC system safely shuts down and restores control at each controller level, and system wide.
 - h. Continual Commissioning: The contractor shall demonstrate that the continual commissioning functions have been programmed and are working as intended.
 - i. Energy Reporting: The contractor shall demonstrate that the Energy Reporting functions have been programmed and are working as intended.
 - j. Fire Alarm Interface: The contractor shall demonstrate that the interface to the building fire alarm system works as intended.
 - k. Operational trend logs for each system that indicate all setpoints, operating points, valve and damper positions, flow rates, mode, and equipment status shall be submitted to the CA. These logs shall cover a two week period and have a sample frequency of not more than 15 minutes. The logs shall be provided in both printed and electronic formats (CSV files with plain English text headers and point naming).
 - l. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The Contractor shall be responsible for any necessary repairs or

revisions to the hardware or software to successfully complete all tests.

5.7 CONTROLS WARRANTY COMMISSIONING REQUIREMENTS

- A. Operator workstation software, project-specific software, graphic software, database software, and firmware updates which resolve known software deficiencies as identified by the Owner, CA, and/or Contractor shall be provided at no charge during the warranty period. Written authorization by the Owner must, however, be granted prior to the installation of any of the above-mentioned items.
1. The warranty shall cover all labor, materials, and overhead costs associated with fulfilling the warranty.
 2. During the warranty maintenance periods the contractor shall visit the site monthly to conduct continuous commissioning point to point and functional testing and shall make programming adjustments to reduce energy consumption, comfort control, safety, and provide for intended operation. The contractor shall provide the Owner with an electronic record log of all continuous commissioning results, service, and program changes on site for the owner. The contractor shall also provide the Owner with a record of all hardware replaced.
 3. Seasonal testing shall occur three times per year (summer, winter, and spring/or fall) during which the contractor shall provide the Owner with one month of trend log data in the form of CSV or Excel files, review these files with the Owner to determine if the system continues to operate efficiently and as intended. Make software programming changes to correct deficiencies identified, and review changes after they have been made to ensure the new adjustments are working properly. The contractor shall also review the energy reporting software program with the Owner to determine if it is working properly and shall make minor changes as requested by the Owner.
 4. The warranty shall include a final project site visit to provide a final continuous commissioning check out, standard maintenance on all parts and final adjustments to schedules; algorithms, loop tuning, and system software back up.
 5. During the warranty period(s), the Owner is responsible for simple system adjustments including space temperature adjustments and maintaining time of day occupancy schedules, preventive maintenance on non-control mechanical components.
 6. Warranty work will be performed during regular working hours (8:30am-5:00pm).
 7. The contractor agrees to employ and assign an account manager and technician (two individuals) to this site that remain knowledgeable about the work performed as part of the warranty. The Contractor shall submit a written report within 3 days of all warranty defects, the action taken, and corrections made for each warranty call.
 8. During each seasonal commissioning test period which occurs within the warranty perform/provide the following in addition to providing the trending and point to point checkouts;
 - a. The BAS contractor shall provide all software and electronic hardware upgrades if they become available within the first 365 days of the start of the first day of the warranty period.
 - b. Provide newly released software documentation updates, engineering and application support and technical bulletins during the warranty period.
 - c. Provide office and field support in identifying and resolving problems with software, operations or programming.
 - d. Perform diagnostics on the network to analyze trunk traffic and optimize the trunk.

- e. Perform system file backup, field panel database and graphics database backup quarterly and at the end of the warranty period.
- f. Check the operation of the WEB browser communications and correct deficiencies.
- g. Create or modify operator workstation(s) graphics as necessary to reflect changes in the system.
- h. Field Control Panels;
 - 1) Inspect interconnecting cables and electrical connections for quality, integrity and tightness.
 - 2) Via personal computer operator workstation, exercise controlled devices with manual command functions and verify proper response of connected field hardware. Check for alarms and overrides using note specific alarms and overrides.
 - 3) Inspect HOA switches for proper position. Coordinate activation of HOA switch test with owner.
 - 4) Perform integrity test and system wide function test through random point checks, commands, selective disabling, and standard checkout procedures.
 - 5) Note system points that are in override condition and review with owner.
 - 6) Note system points that are in alarm condition and review with owner.
 - 7) Inspect interior surfaces and components of panel enclosure and associated primary and secondary control panels and clean if required. Ensure all mounted devices and plug-in components are securely in place.
 - 8) Evaluate binary and analog points for proper operation and reporting. At the personal computer operator workstation, make a performance review of all points.
 - 9) Conduct continuous commissioning control functions specified. Determine new or revised calibration coefficients as required. Make adjustments to connected field devices as required.
 - 10) Enter new revised calibration coefficients into software after completing continuous commissioning control functions for each primary or secondary control panel.
 - 11) Review control loops for proper operation at a time when controlled conditions are stable and at set point. If necessary, verify or adjust tuning constraints (proportional/integral gains, etc.), set points, parameters, and/or reset schedules.
 - 12) Record any parameter values that are different than those shown on program listing.
 - 13) Label and date all field devices that have been changed or added.
 - 14) Operate control valves over full modulation range to ensure proper operation. Adjust as required if installed or modified as part of this contract.
 - 15) Operate dampers over full modulation range to ensure proper operation. Adjust as required if installed or modified as part of this contract.

- 16) Recommend and/or implement algorithm changes to improve energy efficiency.
- 17) Check trend logs and energy reporting software to make sure they are working properly.

PART 6

6.1 PLUMBING SYSTEM COMMISSIONING

Note: All checks or procedures in this section are in addition to the pre-functional and function checklists distributed by the CA.

- A. This section specifies the unique responsibilities that are a part of, or are related to the commissioning process for the plumbing systems. Plumbing systems include those listed in Part 1 of this Specification Section as being commissioned. The plumbing and fire protection systems work is being completed in phases and shall be commissioned at the turnover of each phase as well as at the time of project completion. The final integrated commissioning shall include functionally testing the components and systems as one integrated system.
- B. Plumbing Systems Requiring Commissioning
 1. Fire protection system
 2. Irrigation system
 3. Flow control devices (back flow preventers)
 4. Pumping systems
 5. Special Hazardous waste treatment systems (e.g. for lab wastes)
 6. Domestic hot water systems

6.2 FIRE PROTECTION COMMISSIONING

Note: All checks or procedures in this section are in addition to the pre-functional and function checklists distributed by the CA.

- A. Reference Standards
 1. Fire protection systems shall be tested in accordance with the specifications and following references to the satisfaction of the local Authority Having Jurisdiction (AHJ):
 2. NFPA 13, Installation of Sprinkler Systems.
 3. NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire protection Systems.
 4. NFPA 14, Standpipe and Hose Systems.
- B. NFPA 13A Inspection, Testing and Maintenance of Sprinkler Systems
 1. Clean, flush, start-up and test per NFPA and local AHJ.
 2. Verify connection to fire alarm system.
 3. Confirm signal to fire alarm system all devices.
 4. Confirm location on as-built drawings.
 5. Verify operation of all devices.

6. Verify drain test location and demonstrate. Observe how water flows from outlets.
7. Verify identification used for all devices.
8. Demonstrate maintenance required and training.
9. Provide Certification and AHJ sign-off for total system within the project schedule

C. Domestic Water System

1. Confirm operation of recirculation pump(s), between the storage tank, heat exchangers, the heat source, and building loop.
2. Verify and record pressure and hot water temperature at each plumbing fixture which is furthest from the storage tank in each building on each floor to confirm it is per design/commissioning criteria.
3. Verify and record set points of domestic hot water supply. Verify hot water system is maintaining a maximum of 110 degrees F line temperature in the hot water distribution system.
4. Confirm proper operation at all pressure regulating stations, and all thermostatic valves.
5. Confirm backflow and check valves operation. Test for AHJ.
6. Confirm and record set points of tempered water devices. Measure and record outlet temperatures.
7. Test recovery time for tanks. Drain tank, refill cold water, record time to reheat tank to set point and check against commissioning criteria. Repeat test with tank full and at temperature by opening estimated maximum hot water devices which will flow simultaneously at any given time.
8. Sterilize complete system prior to use. Provide copy of water test results
9. Confirm all piping is properly supported and has necessary vibration isolation and seismic bracing per design.
10. Provide Certification and AHJ sign-off for total system within the project schedule
11. Instruct owner on the operation of shutoff valves
12. Demonstrate operation and maintenance required during training.

PART 7

7.1 ELECTRICAL SYSTEMS COMMISSIONING

Note: All checks or procedures in this section are in addition to the pre-functional and function checklists distributed by the CA.

- A. This section specifies the unique responsibilities that are a part of, or are related to the commissioning process for the electrical systems. The electrical systems work is being completed in phases and shall be commissioned at the turnover of each phase as well as at the time of project completion. The final integrated commissioning shall include functionally

testing the components and systems as one integrated system. The specification requirements identified in this section are in addition to and supplementary to start up execution and testing requirements identified in the specification section 26 000

B. Electrical Systems Commissioning General Requirements

1. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the values recommended by the manufacturers.
2. Test all circuits for proper neutral connections.
3. Lighting fixtures shall be tested with specified lamps in place for not less than ten hours; the fixtures may be checked in sections,
4. Testing recommended by manufacturers shall be required.
5. Failure or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested. Defective material shall be replaced at no additional expense to the Owner.
6. Provide all necessary testing equipment, labor and materials, required for the testing of the systems and equipment. All systems shall be prepared for testing and protected from damage. The cost of all tests shall be included in contract price
7. Verify and correct as necessary the following: voltages, tap settings, trip settings, and phasing on all equipment from the secondary distribution system to points of utilization. Secondary Voltages shall be tested at the bus in the main switchboard, at panel boards, and at such other locations on the distribution systems as necessary. Secondary voltages shall be tested under no-load and full load conditions.
8. Measure minimum and maximum voltages and voltage-between-phase wires under load and immediately deliver a report to the CA on all voltage measurements.
9. The buildings electrical system (including base building system), emergency standby generator system, UPS and PDU systems shall be fully tested per the 2003 NETA Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems which include all applicable tests in Section 7.
10. Coordinate NETA testing of the generator and automatic transfer switchgears with Generator and ATS Manufacturers.
11. Coordinate NETA testing of the UPS and PDU with systems Manufacturers.
12. Test the grounding system per 2003 NETA acceptance testing specifications. The scope shall include building service grounding. Coordinate grounding electrode system testing with lightening protection system contractors.

C. Electrical Systems Requiring Commissioning

1. Lighting controls (daylight, occupancy, timing switches, etc.)
2. Power System (including switchgear, grounding, lightening protection, motor control centers, breaker panels and ground fault circuits)
3. Life and safety systems

4. Fire Alarm System
 5. Emergency Lighting
 6. Stand By Generator
 7. Automatic Transfer Switch
 8. Variable Frequency Drives
 9. Power and control wiring installed by electrical subcontractor which is connected to equipment installed by other subcontractors.
- D. The test requirements listed in this section do not release the subcontractor from the obligation to perform all other appropriate, industry standard, manufacturer-recommend or code-required checks and tests. The following list is a minimum requirement;
1. NEC Articles requiring performance tests
 - a. 230-95C Ground fault protection systems
 - b. 250-56 Grounding electrodes 25 ohms/less
 - c. 305-6 Temporary wiring ground continuity
 - d. 700-4 Emergency systems-Acceptance & Periodic tests
 - e. 701-5 Legally required stand by systems - Witness acceptance tests - Required under load
 2. NFPA requirements and standards
 - a. NFPA 70E Standards for electrical safety in the workplace
 - b. NFPA 70B Recommended practice for electrical equipment maintenance
 - c. NFPA 72 National Fire Alarm Code
 - d. NFPA 780 Standard for the installation of lightning protection systems
 - e. NFPA 111 Standard electrical energy emergency and standard systems
 - f. NFPA 70 National Electrical Code
 - g. NFPA 110 Standard for Emergency and Stand by Systems
 - h. NFPA 101 Life Safety Code
- E. Quality Assurance
1. Qualifications
 - a. The CTC (Certified Testing Company) performing the work of this section shall be qualified to test electrical equipment and is a NETA (International Electrical Testing Association)-certified testing agency. The CTC shall not be associated with the manufacturer of equipment or systems under test
 2. Systems Requiring Commissioning by the CTC

- a. Switchgear and switchboard assemblies
- b. Grounding Systems
- c. Main Service Feeders - Primary Distribution Medium Voltage cables
- d. Secondary Voltage feeder 600 volt cable

3. Test Equipment

- a. The Subcontractor shall provide all test equipment necessary to fulfill the checks and testing requirements.

4. Infrared Thermographic Surveys - The work of this Section shall be performed by a CTC (Certified Testing Company, Electrical), by the EC (Electrical Subcontractor), or the MSR (Manufacturer's Representative) as specified herein. The CTC, EC, or MSR shall document all results testing on check and test procedure forms submitted to and approved by the CA prior to testing. Conduct testing when electrical system is sufficiently loaded. Each device test result shall be recorded [including whether it passes or fails and thermographic survey] and shall include infrared photo depicting component temperatures recorded at the time of survey and a statement indicating whether the temperatures are within acceptable ranges per Maintenance Testing Specifications for Electric Power Distribution Equipment and Systems-International Electric Testing Association,

- a. Electrical Systems Requiring Infrared Thermographic Surveys;

- 1) Switchgear and switchboard assemblies
- 2) Transformers - All except control transformers
- 3) Cable connections and bus bars - All primary service and secondary 208 volt cables.
- 4) Circuit Breakers [panel boards] - All
- 5) Motor Controllers/Starters - All 100 Amp or 50 hp and above including those provided by other subcontractors
- 6) Emergency/Stand by generator ATS

F. Common Acceptance Criteria

- 1. The following common acceptance criteria apply to all electrical equipment, assemblies and features:
 - a. For the conditions, sequences and modes tested, the equipment, integral components and related equipment shall perform as expected and respond as expected to varying loads and changing conditions and parameters appropriately as expected, according to the sequences of operation, as specified, according to acceptable operating practice and the manufacturer's performance specifications. Verify that equipment operates within tolerances specified in: governing codes, acceptance criteria contained in the construction documents, manufacturer's literature and according to good operating practice.
 - b. Systems shall accomplish their intended function and performance.
 - c. Resetting a manual safety shall result in a stable, safe, and predictable return to normal operation by the system.
 - d. Safety circuits and permissive control circuits shall function in all possible

combinations of selector switch positions (hand, auto, inverter, bypass, etc.).

- e. Other acceptance criteria are given in the equipment testing requirements articles or referenced standards.
- f. Additional acceptance criteria will be developed by the CA when detailed test procedures are developed. See specification Sections relevant to each portion of the Work for additional criteria

G. Lighting Systems

1. Scheduled Lighting Controls

- a. Apply the applicable common testing requirements and acceptance criteria
- b. Test Methods. Utilize active testing; provide change of state trend logs for all controlled zones for a two week period. Transfer trends to excel files with zone headers and time stamps.
- c. Manually test 100% of the zones for on/off.

2. Occupancy and Photocell (day lighting) Sensor Lighting Controls

- a. Apply applicable common testing requirements and acceptance criteria. Test all units' functions, including sensor sensitivity and time-to-OFF functions and ensure that sensor location is proper and won't be tripped inadvertently by other occupants and movements outdoors, etc.
- b. Test Methods. Utilize active test methods.
- c. Test 100% of the sensors.
- d. Testing of all photo sensors, locations, factory calibrated and set for appropriate set points and light levels.
- e. Demonstrate all automatic functions using manual control overrides. Test to be performed on days with a mixture of sun and clouds.
- f. Demonstrate all interlocking functions with security and fire alarm systems.
- g. Test on/off functions for each room and record the time delay settings.
- h. Record light levels on working surfaces located in areas where lights are dimmed. Perform tests under variably cloudy conditions.
- i. Additional Acceptance Criteria. Reasonable sensitivity, no inadvertent trips, lights go on/off within 15 seconds of signal.

3. Emergency Lighting System

- a. Apply common testing requirements and acceptance criteria.
- b. Test 100% of emergency lighting fixtures.
- c. Record light levels during testing and verify that they meet IESNA recommendations.
- d. Demonstrate interlock with Emergency Generator during Functional Testing of Emergency Generator System.

H. Emergency Generator System

1. Apply applicable common testing requirements and acceptance criteria subcontractor shall perform pre-functional and functional tests as specified in this section prior to and in preparation for final testing for AHJ.
2. Test according to NETA 7.22.1 and NFPA 110.
3. Record all data and results.
4. Include the following tests:
 - a. When in enclosed spaces, verify combustion and ventilation air damper functions and pressure drop of exhaust
 - b. Verify fuel oil system, diesel fuel storage tank, and level and low fuel indication alarms
 - c. Verify all alarms, meters, and auxiliaries and interlocks to the BAS
 - d. Building Test – Under a cold generator condition, provide full utility power interruption under load and cause emergency power service operation.
 - 1) Verify all generator functions
 - 2) Test auto-transfer switch operation under actual voltage drop
 - 3) Using a power line disturbance monitor, measure the following times: power failure to engine start command, engine start command to engine start (cranking time), engine start to point where generator is at proper volts and frequency and total time from power failure until
 1. ATS switches
 - 4) Verify generator system reporting & control monitoring point-to-point
 - 5) Verify that each circuit and equipment served by emergency power, does power up. Verify all functions of the Emergency Power Response Matrix
 - 6) Verify appropriate mechanical system and control system restart functions of all equipment served by the generator
 - e. Step Load Tests
 - 1) Test at 0%, 25%, 50% and 100% of full load. Measure voltage and frequency and record all gaged engine conditions. The test shall consist of running the engine-generator while connected to the resistive load bank for one hour, and then shutting down for 30 minutes
 - 2) Test for multiple generator starts
 - 3) Verify all operational data and start-up minimum time interval
 - 4) Verify 2-hour full load run full load bank (building load can serve as part of the load)
 - 5) Verify all generator-running characteristics
 - 6) Verify battery-charging system

I. Fire Alarm

1. Apply applicable common testing requirements and acceptance criteria subcontractor shall perform pre-functional and functional tests as specified in this section prior to and in preparation for final testing for AHJ.
2. This section includes testing requirements for the building fire alarm system. Testing shall conform to NFPA 72, system shall also conform to requirements of NFPA (70) National Electric Code, NFPA (72) National Fire Alarm Code and NFPA (101) Life Safety Code. System shall conform to the requirements of the drawings and specifications, correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
3. Final testing shall be performed by a trained and qualified personal employed by an organization listed by a national testing laboratory for the servicing of fire alarms.
4. Final inspections must be certified by a state or local Agent.
5. Document all test procedures and results. A fire alarms system printout of the test annunciation record is not sufficient documentation
6. Verify all fire alarm panel functions, alarms and troubles
7. Verify all functions in the Fire Alarm Response Matrix, including remote communications
8. Verify resetting of all equipment affected by an alarm.
9. Provide test record documentation for the following as a minimum additional testing may be required by cited codes, standards, pre-functional and functional tests, and authorities having jurisdiction;
 - a. Notification to Fire Dept., or monitoring agency
 - b. Elevator capture, fireman's call, communications
 - c. Smoke doors, door releases, fire damper closures
 - d. HVAC fan shutdown – Verify all by zones
 - e. Smoke removal fans and dampers – check rotation
 - f. Security door releases, magnetic locks, turn styles
 - g. Verify audio/visual device locations per design
 - h. Verify smoke detector and pull station zones
 - i. Interface with other systems in same building
 - j. Verify power from emergency source if available
 - k. Verify battery backup time - 1.5 hours minimum

J. Switchgear

1. All testing per NETA 7.1 including but not limited to:
 - a. Visual; Anchorage, clearance, grounding, alignment.
 - b. Circuit breakers, switches, fuses:
 - 1) Correct amperage
 - 2) Set to coordination study
 - 3) Match one-line and BOM
 - c. Relays and protective devices
 - 1) Satisfactory needs of system and local jurisdiction
 - 2) Match coordination study for type and settings

- 3) Set and tested to coordination values
- 4) Control associated devices

d. CT's/PT's

- 1) Ratios, polarity, saturation match system design
- 2) Properly connected to protection or metering devices
- 3) Locking mechanisms/indicating devices functional
- 4) Test all active components (interlocks)
- 5) Phasing tests
- 6) Test ground fault systems

K. Switchgear Ground Fault Protection

1. All tests per NEC 230.95 and NETA 7.14
2. Required by NEC for solidly grounded wye service disconnects → 1000A and between 150V and 600V phase to phase. NEC 230.95
3. Confirm ground connection is on line side of ground fault sensor.
4. Confirm polarity of sensors and conductor routing is correct.
5. Confirm time delay settings correct.
6. Verify ratio/rating of neutral sensor.
7. Test with high current injection method.

L. Lightning Protection System

1. Test per NFPA 780
2. Provide master labeled system
3. Verify insulation complies with design drawings manufacturer's instructions
4. Verify down lead clearance in walls & columns

M. Cables, Low voltage (600 Volt) - Secondary feeders

1. Conduct visual and mechanical inspection and electrical tests per NETA 7.3.2 including optional testing.
2. Provide documentation of test results and correct deficiencies

N. Cables, Medium and High Voltage - Primary feeders

1. Conduct visual and mechanical inspection and electrical tests per NETA 7.3.3 including optional testing.
2. Provide documentation of test results and correct deficiencies

O. Circuit Breakers

1. Air, insulated case/molded case and air low voltage power - Conduct visual and mechanical inspection per NETA 7.6.1.2
2. Air - Medium voltage - Conduct all visual and mechanical inspection as well as tests per

NETA 7.6.1.3

3. Provide documentation of test results and correct deficiencies
- P. Grounding Systems
1. All testing per NETA 7.13 except optional testing
 2. Provide documentation of test results and correct deficiencies
- Q. Motor Controllers/Stations
1. Conduct visual and mechanical inspection per NETA 7.16.1.1
 2. Provide documentation of test results and correct deficiencies
- R. Emergency Systems - ATS
1. Per NETA 7.22.3
 2. Provide documentation of test results and correct deficiencies

PART 8

8.1 CERTIFICATE OF COMMISSIONING READINESS

Certificate of Commissioning Readiness

We certify that the following equipment and systems have been installed in accordance with Contract Documents, and buildings codes, have been cleaned, made safe, have been inspected, are in compliance with manufacturers recommended installation instructions, comply with design intent and are ready to be safely put into use and operated for functional testing.

Equipment/System Description:

General Contractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

8.2 CERTIFICATE OF INSTALLATION AND COMMISSIONING SUBSTANTIAL COMPLETION

Certificate of Substantial Completion of Installation and Commissioning

We certify that the following equipment and systems have been installed in accordance with Contract Documents, and buildings codes, have been cleaned, made safe, have been inspected, functionally tested, are in compliance with manufacturers recommended installation instructions, comply with design intent and sequences of operation, and are ready to be safely put into use and operated continuously. We agree to complete the required seasonal testing and finalize the related items on the issues log, punch list, and/or deficiency report within the agreed upon time frame.

Equipment/System Description:

General Contractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

Subcontractor:

Company:

Signature:

Title:

Date:

END OF SECTION 01 9113

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SECTION 02 0110 - PROTECTION OF EXISTING CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Work of this section, as shown or specified, shall provide Protection of existing conditions in accordance with the requirements of the Contract Documents. The Contractor must accept the site as-is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.

1.02 WORK INCLUDED

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, and all other associated or related items specified herein that are necessary and are required to complete the Work. Work elements shall include:
 - 1. Protection of existing conditions during construction operations.
 - 2. Repair of any damage during construction operations.

1.03 PROJECT CONDITIONS

- A. Structures to be demolished will be discontinued in use and vacated prior to start of work.
- B. City Of New York assumes no responsibility for condition of structures to be demolished.
- C. Conditions existing at time of inspection for bidding purposes will be protected by Commissioner as reasonably practical. Variations within structures may occur by Commissioner removal and salvage operations prior to start of demolition work.
- D. Unless otherwise indicated in Contract Documents or specified by the City of New York, items of salvageable value to Contractor shall be removed from site and structures. Storage or sale of removed items on site will not be permitted and shall not interfere with other work specified.
- E. Explosives shall not be brought to site or used without written consent of Commissioner. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Performance of required blasting shall comply with governing regulations.

1.04 CONTRACTOR RESPONSIBILITIES

- A. General coordination with other trades, Commissioner, etc.
- B. During construction, contractor is responsible for protecting existing conditions that are to remain as necessary.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials as recommended by the manufacturer to protect from damage.

1.06 PERMITS AND APPROVALS

- A. Contractor shall prepare and obtain all required permits prior to construction unless otherwise directed by City of New York. Copies of all permits shall be supplied to the Commissioner prior to the commencement of work authorized by the permit.

1.07 PROJECT RECORD DOCUMENTS

- A. Upon completion of the work of this and related sections, the contractor shall provide the Commissioner with an as-built survey, tied into established project benchmarks. The survey shall be provided in digital (AutoCAD DWG) and paper formats, and shall be signed and sealed by a New York State Licensed Professional Land Surveyor. This survey may be combined with other as-built survey requirements of site-work items, with the approval of the City of New York. Marked-up design plans are not acceptable for the requirements of this section. All survey elevations shall be in North American Vertical Datum (NAVD88).
- B. The contractor shall accurately record any structures which exist on site and are not shown on the contract documents
- C. A pre-construction and post-construction survey of the conditions within the project limits to remain during construction shall be performed by the Contractor.

1.08 RELATED SECTIONS AND DOCUMENTS

- A. Project Specifications:
 - 1. Section 021000 - Protection of Existing Utilities
 - 2. Section 310000 - Earthwork
 - 3. Section 312500 - Erosion and Sedimentation Controls
- B. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.09 REFERENCE STANDARDS

- A. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. The latest edition, as of the date of the executed construction contract, of referenced standards listed below applies to this contract.
 - 1. "Standard Specifications - New York City Department of Transportation, Bureau of Highway Operations" dated June, 1986 with latest amendments. (NYCDOT Standard Specifications)

2. "Standard Details of Construction" of the New York City Department of Transportation, Bureau of Traffic Operations - Street Design, dated August, 1988 with latest amendments. (NYCDOT Standard Details)

PART 2 EXECUTION

2.01 GENERAL DEMOLITION REQUIREMENTS

- A. Demolish site improvements designated to be removed as shown on the architectural drawings. Site improvements shall include but not be limited to structures, retaining walls, foundations, pavements, curbs and gutters, drainage structures, utilities, signage or landscaping.
- B. Locate demolition equipment and remove materials to prevent excessive loading to supporting walls, floors, or framing.

2.02 FILLING VOIDS

- A. Completely fill below grade areas and voids resulting from demolition or removal of structures, underground fuel storage tanks, septic tanks, wells, cisterns, etc., using general fill materials as defined in Section 310000.
- B. Areas to be filled shall be free of standing water, frost, frozen or unsuitable material, trash, and debris prior to fill placement.
- C. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

2.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish, and other materials resulting from demolition operations from site. Leave areas of work in clean condition.
- B. No burning of any material, debris, or trash on-site or off-site will be allowed except when allowed by appropriate governing authority and City of New York. If allowed as stated above, burning shall be performed in manner prescribed by governing authority. Attend burning materials until fires have burned out and have been completely extinguished.
- C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to areas that are approved for disposal by governing authorities and City of New York.

2.04 PROTECTION

- A. The Contractor shall become acquainted with the existence and location of all surface and subsurface structures within the project area. Contractor shall not damage any of those that are to remain and shall leave them accessible.

- B. Monuments, bench marks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced at own expense.
- C. Flag, barricade or suitably protect existing conditions during construction operations and equipment movement.
- D. Provide any other safety measures and follow any additional procedures requested by the City of New York.

2.05 DAMAGE

- A. Any damage to existing conditions by the Contractor or his subcontractors shall be immediately repaired with the least impact to the operational standards. If the repairs are not immediately addressed by the Contractor, the Commissioner will contract for the repair at the Contractor's expense.
- B. Post construction condition surveys shall be conducted by the Contractor. Any damage to the site shall be repaired to the condition identified in the preconstruction survey. The Commissioner shall determine the acceptability of any repairs.

END OF SECTION

SECTION 021000 - PROTECTION OF EXISTING UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Work of this section, as shown or specified, shall provide protection of existing utilities in accordance with the requirements of the Contract Documents. The Contractor must accept the site as-is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.

1.02 WORK INCLUDED

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, and all other associated or related items specified herein that are necessary and are required to complete the Work. Work elements shall include:
 - 1. Identification and field mark-out of all on-site utility lines within the project limits to remain in operation and/or be relocated during construction.
 - 2. Protection and support of utilities during construction operations.
 - 3. Repair of any damage during construction operations.

1.03 CONTRACTOR RESPONSIBILITIES

- A. General coordination with other trades, Commissioner, etc.
- B. Notify affected utility companies and Owner before starting work and comply with their requirements.
- C. Contractor is responsible for protecting existing utilities during construction as necessary.

1.04 PERMITS AND APPROVALS

- A. Contractor shall prepare and obtain all required permits prior to construction unless otherwise directed by Commissioner. Copies of all permits shall be supplied to the Commissioner prior to the commencement of work authorized by the permit.
- B. Connections with existing utilities shall be performed in accordance with the requirements of the Owner or Agency of the utility. The Contractor shall be required to comply with all such requirements, including securing all permits, and payment of all permit and/or connection fees.

1.05 PROJECT RECORD DOCUMENTS

- A. Upon completion of the work of this and related sections, the contractor shall provide the Commissioner with an as-built survey of all new water, sewer, electric, telecommunication, and gas service lines. The data shall include invert elevations at the property line and at connection point to existing utility infrastructure, tied into established project benchmarks. The survey shall be provided in digital (AutoCAD DWG) and paper formats, and shall be signed and sealed by a New York State Licensed Professional Land Surveyor. This survey may be combined with other as-built survey requirements of site-work items, with the approval of City of New York. Marked-up design plans are not acceptable for the requirements of this section. All survey elevations shall be in North American Vertical Datum (NAVD88).

- B. The contractor shall accurately record any structures which exist on site and are not shown on the contract documents.
- C. A pre-construction and post-construction survey of the condition of all utilities within the project limits to remain during construction shall be performed by the Contractor.
- D. The Contractor shall provide a survey of the actual locations of capped utilities and subsurface obstructions that will remain after demolition. Submit record as part of closeout submittals.

1.06 RELATED SECTIONS AND DOCUMENTS

- A. Project Specifications:
 - 1. Section 020110 - Protection of Existing Conditions
 - 2. Section 310000 - Earthwork
 - 3. Section 312500 - Erosion and Sedimentation Controls
 - 4. Section 330000 - Other Utilities
 - 5. Section 331000 - Water Utilities
 - 6. Section 333000 - Sanitary and Storm Sewerage Utilities
- B. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- C. Project Documents:
 - 1. Refer to geotechnical report dated January 2009 by Louis Berger and Associates, P.C.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.01 IDENTIFICATION

- A. Existing Utilities: Locate existing underground utilities in and beyond the areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during the work. In the event of identifying and unforeseen conflict/condition, notify the Owner immediately.
- B. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by the Construction Manager and then only after acceptable temporary utility services have been provided.

3.02 PROTECTION

- A. Prior to commencement of any work, consult the records for existing utilities, and note all conditions and limitations, which might affect the work.
- B. The Contractor shall become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area. Contractor shall not damage any of those that are to remain and shall leave them accessible.

- C. The work shall be executed so that no damage or injury will occur to existing public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric or any other pipes. Should any damage or injury caused by the Contractor, or anyone in the Contractor's employ, or by the work under this Contract occur, the Contractor shall, at his own expense, make good such damage and assume all responsibility for such injury.
- D. The above shall also include the protection of all existing utilities (including, but not limited to sewers, water lines, gas lines, electrical lines and telecommunication lines) to remain in use within and adjacent to the area affected by the work of the project.
- E. Monuments, bench marks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced at own expense.
- F. Flag, barricade or suitably protect existing utilities during construction operations and equipment movement.
- G. At a minimum, Contractor shall provide timber mats at locations where equipment will cross existing utilities. Provide any other safety measures and follow any additional procedures requested by the City of New York and the utility owner.

3.03 DAMAGE

- A. Any damage to existing utilities by the Contractor or his subcontractors shall be immediately repaired with the least impact to the utility service and to the operational standards. If the repairs are not immediately addressed by the Contractor, the utility owner and/or the Commissioner will contract for the repair at the Contractor's expense.
- B. Post construction condition surveys shall be conducted by the Contractor. Any damage to the utilities shall be repaired to the condition identified in the preconstruction survey. The Commissioner and/or utility owner shall determine the acceptability of any repairs.

END OF SECTION

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SECTION 03 1000 - CONCRETE FORMWORK

PART 1 - GENERAL

1.01 GENERAL

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract.

1.02 SCOPE

- A. Provide all labor, materials, equipment, services and transportation for formwork and related accessories required to complete all cast-in-place concrete work as shown on Drawings, as specified herein, and as required by the job conditions.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- | | | |
|----|--|------------------------|
| A. | Submittals | DDC General Conditions |
| B. | Quality Control | DDC General Conditions |
| C. | Concrete Reinforcement and Embedded Assemblies | Section 032000 |
| D. | Cast-in-Place Concrete | Section 033000 |
| E. | Thermal and Moisture Protection | Division 7 |

1.04 CODES AND STANDARDS

- A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.
- B. Standards:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 237 - Self Consolidating Concrete.
 - 3. ACI 301 - Specifications for Structural Concrete.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
 - 5. ACI 347 - Guide to Formwork for Concrete.
 - 6. ACI 347.2R - Guide for Shoring/Reshoring of Concrete Multistory Buildings
- C. Definitions:
 - 1. See Section 033000.

1.05 SUBMITTALS

- A. Required Submittals - Where the SUBMITTALS section of this Specification is in conflict with DDC General Conditions, the more stringent requirements for the Contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested.

1. Submittal Schedule
 2. Formwork Shop Drawings
 3. Shoring/Reshoring Calculations
 4. Product Data
 5. Samples
 6. Compatibility Certification
 7. Hazardous Materials Notification
- B. Submittal Schedule: See Section 033000.
1. Formwork Shop Drawings:
 - a) Submit for record: Formwork shop drawings sealed and signed by a registered Design Professional licensed to practice as a Professional Engineer in NY State. Shop drawings shall clearly indicate but not be limited to the following:
 - i. Size, type and quality of form materials including conditions at tops and ends of walls. If wood is used, indicate species.
 - ii. Form construction indicating structural stability and jointing including special form joints or reveals required by Contract Documents
 - iii. Location and pattern of form tie placement, and other items that affect the appearance of concrete that will remain exposed to view.
 - iv. Form finish clearly indicating proper locations and full coordination with concrete finishes required by Contract Documents.
 - v. Layout, procedures, and sequencing of shoring and reshoring that correlates with the information contained in the shoring/reshoring calculations described below.
 - vi. Comprehensive (a single drawing per area/element) layout drawings showing openings in structural members, including floor slab, shearwalls, columns and beams. Drawings shall consolidate the work of all trades and shall be coordinated by the Contractor. Submit with or prior to reinforcement submittal for same element/area.
 - b) Submit for Review
 - i. Location of proposed construction joints in walls, floors, slabs, beams per Specification Section 033000.
- C. Shoring/Reshoring Calculations: Submit for record. Calculations sealed and signed by a registered Design Professional licensed to practice as a Professional Engineer in the state where the project is located. Calculations shall clearly address but not be limited to the following:
1. Shoring removal and reshoring installation procedure including timing and sequencing.
 2. Concrete age and strength at the time of each shoring/reshoring operation.
 3. Description of construction loads assumed including concrete, formwork, and construction live load in accordance with ACI 347.
 4. A description of the distribution of construction loads between the shored/reshored levels.
 5. The total construction load imposed on all levels supporting shoring/reshoring at each stage of the shoring/reshoring cycle.
 6. A written statement by the Professional Engineer that the total construction load imposed on any level supporting shoring/reshoring, at all stages of the shoring/reshoring cycle, accounting for concrete age and relative strength at time of loading, meets the requirement of Section 3.2.
- D. Product Data: Submit copies of manufacturers' product data and installation instructions for materials used in exposed concrete work, including form liners, release agents, manufactured form systems, ties, and accessories.
- E. Samples: At request of Commissioner, submit samples of form ties and spreaders.
- F. Compatibility Certification: Submit for record a written statement certifying that form release agent used is compatible with subsequent architectural finish materials applied to concrete surfaces. Submit along with manufacturer's data.

- G. Hazardous Materials Notification: Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Commissioner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- H. Submittal Process: See Section 033000

1.06 FORMWORK DESIGN

- A. Design of Formwork, Shoring/Reshoring, and its removal is the Contractor's responsibility.
- B. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads per SEI/ASCE 37-02 that might be applied, until such loads can be supported by the concrete structure.

1.07 DESIGN REQUIREMENTS

- A. Forms shall be designed for fabrication and erection in accordance with Design Professionals' requirements and recommendations of ACI 301, 318 and 347.
- B. Design formwork in a manner such that the total construction load does not at any time exceed the total design load of new or existing construction and accounts for concrete age and relative strength at time of loading. See Section 3.2 for shoring/reshoring requirements.
- C. Design formwork for loads and lateral pressures outlined in Section 2.2, ACI 347, and wind and seismic loads as specified by SEI/ASCE 37-02 unless otherwise controlled by local building code.
- D. Design formwork to include loads imposed during construction, including weight of construction equipment, concrete mix, height of concrete drop, rate of filling of formwork, vibrator frequency, ambient temperature, foundation pressures, lateral stability, temporary imbalance or discontinuity of building components, and other factors pertinent to safety of structure during construction.
 - 1. The use of flowing concrete [8" (200mm) to 10" (250mm) slump] of Self-Consolidating Concrete requires a review of the formwork design based on the rate of placement and setting time of the mix. Unless shown to be sufficient otherwise, formwork design shall conform to the requirements of ACI 237.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with DDC General Conditions, including the following:
 - 1. Store forms and form materials clear of ground and protect from damage.

1.09 QUALITY ASSURANCE BY TESTING AGENCY

- A. Field Quality Assurance General: The Testing Agency shall test and inspect concrete formwork as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such a defect is discovered nor shall it obligate the Commissioner for final acceptance.
- B. Testing Agency shall provide qualified personnel at site to inspect formwork using the latest Contract Documents and approved shop drawings as follows:
 - 1. Prior to placement of reinforcement, inspect formwork for grade, quality of material, absence of foreign matter, and other imperfections that might affect suitability of concrete placement and tolerances stated herein.
 - 2. Inspect forms for location, configuration, compliance with specified tolerances, block outs, camber, shoring ties, seal of form joints and compliance with Contract Documents.

3. Verify condition of bond surfaces, locations and sizes of all accessories, embedment items, and anchorage for prevention of displacement.
 4. Verify proper use/application of form release agents.
 5. Inspect concrete surfaces immediately after removal of formwork and prior to any patching or repair work.
- C. Testing Agency shall submit inspection, observation, and/or test reports to the Commissioner and Design Professionals, as required herein and shall provide an evaluation statement in each report stating whether or not concrete formwork conforms to requirements of Specifications and Drawings and shall specifically note deviations therefrom.
- D. Immediately report deficiencies to the Contractor and the Commissioner.

1.10 QUALITY ASSURANCE BY CONTRACTOR

- 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. Contractor's Testing Agency Services: Required as specified in DDC General Conditions, and herein.
- C. Materials and installed work may require testing and retesting at any time during progress of work, as directed by the Commissioner. Tests, including retesting of rejected materials for installed work will be done at Contractor's expense.

1.11 QUALITY CONTROL BY CONTRACTOR

- A. See Section 033000.

1.12 PERMITS AND WARRANTY

- A. Permits: See Section 033000.
- B. Warranty: Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:
1. Discoloration of concrete scheduled to remain exposed to view.
 2. Damage of concrete finishes caused by forms.
 3. Damage of concrete caused by form stripping.
 4. Non-compliance with form finishes required for designated architectural finishes.
 5. Non-compatibility of form release agent with subsequent architectural finish materials applied to concrete surfaces.
 6. Excessive and/or noticeable bowing in placed concrete members caused by deflection of formwork during concrete placement.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products of the manufacturers specified in this section establish the minimum functional, aesthetic and quality standards required for work of this section.

2.02 FORMWORK REQUIREMENTS

- A. General Requirements:
1. Formwork shall meet construction safety regulations for NYC.
 2. Forms shall be removable without impact, shock or damage to concrete surfaces, the structure and adjacent materials.
 3. Forms shall be tight-fitting, designed and fabricated for required finishes and to withstand concrete weight and maintain tolerances as specified in ACI 117 for the following designations: (See architectural drawings for locations).
 - a) Class A - For surfaces prominently exposed to public view where appearance is of special importance.
 - b) Class B - Coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.
 - c) Class C - General Standard for permanently exposed surfaces where other finishes are not specified.
 - d) Class D - Minimum quality surface where roughness is not objectionable, usually applied where surfaces will be concealed.
 4. Furnish forms in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings, using form materials with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
 5. Butt Joints: Shall be solid and complete with backup material to prevent leakage of cement paste.
- B. Form Finishes for Exposed Surfaces:
1. Type: Straight, smooth, free of cement paste leaks at butt-joints, surface imperfections and other irregularities detrimental to appearance of finished concrete, fully coordinated with requirements for required finish material.
 2. Form exposed areas of columns, beams, ledges, balcony fascias to achieve true alignment and level soffit of spandrel beams and concrete edges. All such areas must be sharp, straight and true to line and level. Spandrel beams and concrete canopies and ledges must have adequate shoring to prevent any visible amount of sag and sufficient bracing to prevent any lateral movement during construction.

2.03 FORM MATERIALS

- A. General: Plywood, fiberglass, metal, metal-framed plywood faced, or other acceptable panel-type materials.
1. Provide materials with sufficient strength to prevent warping.
- B. Plywood: Of species and grade suitable for intended use, sound undamaged sheets with clean true edges, minimum 5/8" (16mm) thick, complying with U.S. Product Standard PS-1.
1. Other Acceptable Sheet Materials: 14 gauge (2.0mm) sheet steel or fibrous glass reinforced resin.
- C. Lumber: Construction grade or better consistent with calculation requirements, without loose knots or other defects.
1. Use only where entire width can be covered with one board 11-1/4" (285mm) or less in width.
- D. Forms for Cylindrical Columns and Supports: Metal, glass-fiber reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications.
1. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to support weight of placed concrete without deformation.
- F. Chamfer for Form Corners:

1. Types: Chamfer strips of wood, metal, PVC or rubber fabricated to produce smooth form lines and tight edge joints, 3/4" (20mm) size, maximum possible lengths.
 2. Required for all exposed corners of beam, walls and column forms.
- G. Form Ties:
1. Type: Factory-fabricated metal, adjustable length, designed to prevent form deflection and to prevent spalling concrete upon removal.
 2. Ties used for architecturally exposed concrete shall be galvanized.
 3. Ties shall not leave metal closer than 1-1/2" (40mm) to exposed surface.
 4. When removed, ties shall not leave holes larger than 1" (25mm) diameter in concrete surface.
 5. Removable Ties: Use type with tapered cones, 1" (25mm) outside diameter, for concrete walls which will remain exposed to view and scheduled for architectural finishes.
 6. Snap-Off Ties: Use for concrete walls below grade and walls which will not remain exposed to view and are not scheduled for architectural finishes.
 7. Wire Ties: Not acceptable.
- H. Nails, Spikes, Lag Bolts, Thru-Bolts, Anchorages:
1. Type: Of size, strength and quality to meet the required quality of formwork.
- I. Form Release Agent:
1. Type: Commercial formulation form release agent of non-emulsifiable type which will not bond with, stain, or adversely affect concrete surfaces. Form release agent shall not impair subsequent treatment of concrete surfaces requiring bond or adhesion, or impede the wetting of surfaces to be cured with water or curing compounds. Form release agent shall be compatible with subsequent architectural finish materials applied to concrete surfaces. Apply in compliance with manufacturers' instructions.
 2. Form release agent shall meet, at a minimum, all federal and state requirements for volatile organic compounds (VOC's). Per NYC EPP Minimum Standards for Construction Projects, the maximum concentration of VOC shall not exceed 350 grams per liter.
 3. For Steel Forms: Non-staining rust-preventative type.
- J. Reglets: Provide sheet metal reglets formed of same type and gauge as flashing metal, unless indicated otherwise on Drawings. Where resilient or elastomeric sheet flashing, or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge (0.55mm) galvanized sheet metal. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- K. Coordinate with materials as specified in Section 032000/Concrete Reinforcement and Embedded Assemblies.

PART 3 - EXECUTION

3.01 FORMWORK

- A. General:
1. Inspect areas to receive formwork.
 - a) Immediately report to Testing Agency and Commissioner in writing the conditions that will adversely affect the Work.
 2. Construct forms to sizes, shapes, lines, and dimensions shown on Contract Documents, and to obtain accurate alignment, location, grades, level and plumb work in finished structures.
 3. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins, and to maintain alignment.

4. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, drips, bevels, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in the Work.
 5. Comply with shop drawings, ACI 301, 318, 347 and Contract Documents.
 6. Maintain formwork and finished work construction tolerances complying with ACI 301 and 117.
 7. Provide shore and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.
 8. Erect forms for easy removal without hammering or prying against concrete surfaces.
 9. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
 10. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
 11. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
 12. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce smooth lines and tight edge joints.
 13. Design, erect, support, brace and maintain formwork and shoring to support loads until such loads can be safely supported by the concrete structure.
 14. Where specifically shown on the Contract Documents as monolithic, upturned beams, curbs and similar members in connection with slabs shall be formed so that they can be poured integrally with slabs.
- B. Concrete Accessories and Embedded Items:
1. Install into forms concrete accessories, sleeves, inserts, anchor bolts, anchorage devices and other miscellaneous embedded items furnished by other trades or that are required for other work that is attached to or supported by cast-in-place concrete.
 - a) Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached.
 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
 3. Install dovetail anchor slots in concrete structures as indicated on drawings or required by other trades.
 4. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces.
 5. Coordinate with Section 032000/Concrete Reinforcement and Embedded Assemblies.
 6. Install accessories and embedded items straight, level, plumb and secure in place to prevent displacement by concrete placement.
- C. Temporary Openings:
1. Locate temporary openings in forms at inconspicuous locations.
 2. For clean-outs and inspection before concrete placement, locate temporary openings where interior area of formwork would otherwise be inaccessible.
 3. For cleaning and inspections, locate openings at bottom of forms to allow flushing water to drain.
 4. Securely brace temporary openings and set tightly in forms to prevent loss of concrete.
 5. Close temporary openings with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be noticeable on exposed concrete surfaces.
- D. Provisions for Other Trades: Coordinate and provide openings in concrete formwork to accommodate work of other trades.
1. Determine size and location of openings, recesses, chases, offsets, openings, depressions, and curbs from information provided by trades requiring such items.
 2. Accurately place and securely support items built into forms.
- E. Cleaning:
1. Normal Conditions:

- a) Thoroughly clean forms and adjacent surfaces to receive concrete.
- b) Remove chips, wood, sawdust, dirt, standing water or other debris just before placing concrete.
- c) Flush with water or use compressed air to remove remaining foreign matter.
- d) Verify that water and debris can drain from forms through clean-out ports.
- 2. During Cold Weather:
 - a) Remove ice and snow from within forms.
 - b) Do not use de-icing salts.
 - c) Do not use water to clean out completed forms, unless formwork and concrete construction will proceed within heated enclosure.
 - d) Use compressed air or other means to remove foreign matter.
- F. Form Release Agents
 - 1. Before placing reinforcing steel and miscellaneous embedded items, coat contact surfaces of forms with an approved non-residual, low VOC form release agent in accordance with manufacturer's published instructions.
 - 2. Do not allow release agent to accumulate in forms or come into contact with reinforcement or concrete against which fresh concrete will be placed.
 - a) Coat steel forms with nonstaining, rust-preventative material.
 - 3. Remove form release agent and residue from reinforcement or surfaces not requiring form coating.
- G. Before Placing Concrete:
 - 1. Inspect and check completed formwork, shoring and bracing to ensure that work is in accordance with formwork requirements of this section and Contract Documents, and that supports, fastenings, wedges, ties, and parts are secure.
 - a) Make necessary corrections or adjustment to formwork to meet tolerance requirements.
 - 2. Retighten forms and bracing before concrete placement to prevent mortar leaks and maintain proper alignment.
 - 3. Notify Testing Agency sufficiently in advance of placement of concrete to allow inspection of completed and cleaned forms.
- H. During Concrete Placement:
 - 1. Maintain a check on formwork to ensure that forms, shoring, ties and other parts of formwork have not been disturbed by concrete placement methods or equipment.
 - 2. Use positive means of adjustment as required for formwork settlement during concrete placing operations.
- I. Camber:
 - 1. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.
 - 2. Camber bottom forms where indicated on the drawings. Whenever forms are cambered, screeded levels for establishing top of concrete must be cambered to the same amount and to the same profiles such that scheduled depth of member is not reduced by lifting of forms. Check camber and adjust forms before initial set as required to maintain camber.
- J. Surface Defects:
 - 1. Install forms that will not impair the texture of the concrete and are compatible with the specified finish type.
- K. Formwork Loads on Grade
 - 1. Where loads from formwork bear on grade, provide suitable load-spreading devices for adequate support and to minimize settlement. In no event shall frozen ground or soft ground be utilized directly as the supporting medium.
- L. Footings and Grade Beams:

1. Provide forms for footings and grade beams if soil or other conditions are such that earth trench forms are unsuitable.
 2. When trench forms are used, provide an additional 1" (25mm) of concrete on each side of the minimum design profiles and dimensions indicated.
 3. Earth forming of concrete elements is not acceptable.
- M. For slabs-on-grade, secure edge forms in such a manner as to not move under weight of construction loads, construction and finishing equipment, or workers.

3.02 SHORES AND RESHORES

- A. Comply with ACI 347.2R for shoring and reshoring in multistory construction, and as specified herein.
1. For all concrete structures, extend shoring/reshoring to ground.
 2. For shoring/reshoring placed on mud sills, adjustments shall be made by contractor to account for ground settlement.
 3. Locate shores/reshores such that the factored (ultimate) construction load imposed onto any slab or beam at any time during the construction cycle does not exceed 90% of the factored (ultimate) design load for that slab or beam, scaled down to reflect effect on capacity of lower concrete strength at time of loading.
 4. Construction load shall include the weight of wet concrete, total weight of formwork and shoring/reshoring, and a minimum construction live load of 50 psf [2.5kPa] (increase if construction operations will produce higher loading). Design load includes self-weight of the slab, and superimposed dead and live loads as indicated on the drawings.
 5. For comparison of construction loads to design loads, compare factored (ultimate) construction loads to factored (ultimate) design loads. Use the same load factors for the construction load that were used for the design of the slabs.
 6. For flat plate or flat slab construction "backshores" or "preshores" as defined in ACI 347 shall be permitted only if appropriate calculations and construction sequences are provided demonstrating that the accumulation of shore loads will not overload any slab. In the absence of such calculations and construction sequences, shores must be removed and reshores installed in a sequence such that each floor is permitted to deflect and carry its own weight prior to the installation of reshores.
 7. Reshores shall not be removed until the concrete has attained its specified 28 day strength.

3.03 REMOVING FORMS

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50oF [10oC] for 12 hours after placing concrete, provided concrete is sufficiently hard to avoid damage by form-removal operations, and provided curing and protection operations are maintained after removal of formwork.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed until concrete has attained at least 75% of design compressive strength as proven by cylinder test. If stripping occurs before 3 days, 100% strength must be achieved.
1. Provide reshores as required per ACI 347.
 2. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Remove formwork progressively using methods to prevent shock loads or unbalanced loads from being imposed on structure. Comply with ACI 347.
- D. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.

- E. Reshore structural members where required due to design requirements, construction requirements, or construction conditions.
 - 1. Reshore on same day shoring and forms are removed.
- F. Whenever formwork is removed during the curing period, the exposed concrete shall be cured per requirements of Section 033000.
- G. All wood formwork, including that used in void spaces, pockets and other similar places shall be removed.
- H. Form tie holes shall be filled as per approved samples submitted to the Commissioner.
- I. The Contractor shall assume responsibility for all damage due to removal of the forms.

3.04 RE-USING FORMS

- A. Before forms can be re-used, surfaces that will be in contact with freshly poured concrete must be thoroughly cleaned, damaged areas repaired, and projecting nails withdrawn.
 - 1. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable.
 - 2. Apply new form release agent on re-used forms.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets.
- C. Forms for exposed concrete may be reused only if the surfaces have not absorbed moisture and have not splintered, warped, discolored, stained, rusted or peeled, subject to acceptance by the Commissioner. The Commissioner reserves the right to require the Contractor to remove and reconstruct such formwork as will produce subsequent areas that are acceptable. Do not use "patched" forms for exposed concrete surfaces, unless approved by the Commissioner.

END OF SECTION

SECTION 03 2000 - CONCRETE REINFORCEMENT AND EMBEDDED ASSEMBLIES

PART 1 - GENERAL

1.01 GENERAL

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract.

1.02 SCOPE

- A. Provide all labor, materials, equipment, services and transportation for reinforcing steel, accessories, embedments and miscellaneous anchorage accessories, joint fillers, and waterstops for cast-in-place concrete work as shown on Drawings, as specified herein, and as required by the job conditions.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- | | |
|------------------------------------|------------------------|
| A. Submittals | DDC General Conditions |
| B. Quality Control | DDC General Conditions |
| C. Concrete Formwork | Section 031000 |
| D. Cast-in-Place Concrete | Section 033000 |
| E. Thermal and Moisture Protection | Division 7 |

1.04 CODES AND STANDARDS

- A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.
- B. Standards:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
 - 5. ACI 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary
 - 6. ACI 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary
 - 7. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein.
 - 8. AWS D1.1 - Structural Welding Code-Steel.
 - 9. AWS D1.4 - Structural Welding Code-Reinforcing Steel.
 - 10. CRD C 572 - Specification for Polyvinylchloride Waterstops.
 - 11. Concrete Reinforcing Steel Institute "Manual of Standard Practice"
 - 12. ASTM D3963 Fabrication and Jobsite Handling of epoxy Coated Steel Reinforcing Bars.
- C. Definitions:
 - 1. See Section 033000.

1.05 SUBMITTALS

- A. Required Submittals - Where the SUBMITTALS section of this Specification is in conflict with DDC General Conditions, the more stringent requirements for the Contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested.
- (1) Submittal Schedule
 - (2) Shop Drawings
 - (3) Product Data
 - (4) Mill Reports
 - (5) Reinforcement Strain Test
 - (6) Hazardous Materials Notification
1. **Submittal Schedule:** See Section 033000.
 2. **Shop Drawings:** Submit shop drawings that shall clearly indicate, but not be limited to:
 - a) All details, dimensions and information required for fabrication and placement of concrete reinforcement in accordance with Contract Documents, prepared in accordance with ACI 315 recommendations.
 - b) Elevations, plans, sections, and dimensions of concrete work with required reinforcement clearances.
 - c) Ledges, brackets, openings, sleeves, anchor rods, embedments, prefabricated bent-in dowel keyway systems, electrical conduit and items of other trades including interference with reinforcing materials.
 - d) Sizes, grade designations, spacing, locations, and quantities of wire fabric, reinforcement bars, temperature and shrinkage reinforcement dowels.
 - i. Do not use dimensions scaled from Contract Drawings to determine bar lengths.
 - ii. Hooks and bends not specifically dimensioned shall be detailed per ACI 318.
 - e) Bending and cutting schedules, assembly diagrams, splicing and connection requirements, details, and laps.
 - f) Each type of supporting and spacing devices, including miscellaneous accessories.
 - g) Construction joint type, details and locations. Contractor shall coordinate with concrete pour schedule and submit for action by the Commissioner.
 - h) Submit comprehensive (a single drawing per area/element) layout/placement drawings. Drawings shall consolidate the work of all trades and shall be coordinated by the Contractor. Submit with or prior to reinforcement submittal for same element/area. Drawings shall include:
 - i. Concrete accessories and embedded items, including fabrication details of items to be placed (exclusive of reinforcement.)
 - ii. Opening in structural members, including floor slab, shearwalls, columns and beams.
 3. **Product Data:** Submit for approval for each type of product identified in Part 2. Product Data shall be clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published installation instructions and I.C.C reports, where applicable, for products of each manufacturer specified in this section.
 4. **Mill Reports:** Submit for record.
 5. **Reinforcement Strain Test:** For Grade 75 reinforcement, submit for record certification that steel has a yield strength of no less than 75 ksi as measured by both ASTM A615 and ACI 318 Section 3.5.3.2 procedures.
 6. **Hazardous Materials Notification:** Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Commissioner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- B. Submittal Process: See Section 033000

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with DDC General Conditions, including the following:
 - 1. Deliver reinforcing steel to Project site bundled, tagged and marked.
 - a) Use weatherproof tags indicating bar sizes, lengths and other information corresponding to markings shown on placement diagrams.
 - 2. Deliver welded wire fabric in sheets. Do not deliver in rolls.
 - 3. During construction period, properly store reinforcing steel and accessories to assure uniformity throughout the Project.
 - 4. Deliver and store welding electrodes in accordance with AWS D1.4.
 - 5. Immediately remove from site materials not complying with Contract Documents or determined to be damaged.
 - 6. Store reinforcing steel above ground so that it remains clean.
 - a) Maintain steel surfaces free from materials and coatings that might impair bond.
 - b) Keep covered.
 - c) Protect against corrosion or deterioration of any kind.

1.07 QUALITY ASSURANCE BY TESTING AGENCY

- A. Field Quality Assurance General: The Testing Agency shall test and inspect concrete reinforcement and embedded assemblies as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Commissioner for final acceptance.
- B. Immediately report deficiencies to the Contractor, Commissioner and Design Professionals.

1.08 QUALITY ASSURANCE BY CONTRACTOR

- 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.
 - 1. Welders shall be qualified in accordance with applicable AWS Code within 12 months before starting the work.
 - a) Make qualification records available to the Commissioner upon request.
- 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.

1.09 QUALITY CONTROL BY CONTRACTOR

- A. See Section 033000.

1.10 OBSERVATIONS AND CORRECTIONS BY THE COMMISSIONER

- A. See Section 033000.

1.11 PERMITS AND WARRANTY

- A. Permits: See Section 033000.
- B. Warranty: Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:

1. Bars with kinks or bends not indicated on Drawings or on approved shop drawings.
2. Bars damaged due to bending, straightening or cutting.
3. Bars heated for bending.

PART 2 - PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel:
1. Type: Deformed billet steel bars, ASTM A 615, Grade 60 or 75 as indicated on Drawings.
 2. Size: As indicated on structural Drawings.
 3. Where indicated on Drawings, reinforcing steel shall be hot-dipped galvanized after fabrication in accordance with ASTM A 767, Class II, with galvanizing material protected from embrittlement during galvanizing process in accordance with ASTM A 143.
 - a) Galvanized finish shall meet the bend and shear test requirements of ASTM A 615.
 4. Epoxy-Coated: ASTM A 775 where indicated on Drawings.
 5. Weldable reinforcement: ASTM A 706 where indicated on Drawings.
- B. Welded Wire Reinforcement:
1. Type: steel wire, plain finish, ASTM A 82.
 2. Type: steel wire, deformed, ASTM A 496.
 3. Size: As indicated on structural Drawings.
 4. Where indicated on Drawings, welded wire reinforcement shall be hot-dipped galvanized after fabrication in accordance with ASTM A 767, Class II, with galvanizing material protected from embrittlement during galvanizing process in accordance with ASTM A 143.
 - a) Galvanized finish shall meet the bend and shear test requirements of ASTM A 615.
 5. Plain Steel Welded Wire Reinforcement: ASTM A 1064.
 6. Deformed Steel Welded Wire Reinforcement: ASTM A 497.
 7. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A.
- C. Shear Reinforcement At Slab-Column Connections:
1. Type: Steel studrail assemblies for shear reinforcement at slab-column connections.
 - a) Shear studs shall be in accordance with ASTM A108, Grade C1015.
 - b) Rails shall be low carbon steel Type 44W.
 - c) Studs shall be welded in accordance with AWS D1.1.
 2. Size: As indicated on structural Drawings.
 3. Installation: Per manufacturer's instructions.
 4. Supports: Use plastic molded plastic chairs as provided by the manufacturer to maintain the bottom rebar cover as specified on the Drawings. Tie studrails to adjacent top bars to maintain vertical position.
- D. Reinforcement Coating Repair Materials:
1. Apply repair coating in accordance with the manufacturer's written procedures.
 2. Galvanized Repair Coating: Zinc-based solder, paint containing zinc dust or sprayed zinc complying with ASTM A780.
 3. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/ A 775M.
 - a) The maximum amount of repaired damaged areas shall not exceed 2% of the surface area in each linear foot of each bar. If more than 2% of the surface area in each linear foot of bar is damaged, bar shall be replaced.

2.02 ACCESSORIES

- A. Tie Wire:
 - 1. Type: Minimum 16 gauge (1.5mm) annealed steel wire, ASTM A 510 and ASTM A 853.
 - 2. Wire Bar Type: Comply with CRSI.
- B. Mechanical Splicing Systems:
 - 1. Mechanical tension and compression splicing systems shall be used where indicated on Drawings or at contractor's option. For seismic design categories D, E and F, in plastic hinge regions, only Type 2 mechanical splices are permitted.
 - 2. Acceptable Products: Bartec Couplers by Dextra, Santa Fe Springs, CA or Lenton Cadweld by Erico, Solon, OH or Bar Lock coupler system by Dayton Superior, Miamisburg, OH or Grip-Twist by Bar Splice, Dayton, OH or ZAP Screwlok by Bar Splice, Dayton, OH or Lenton Couplers by Erico, Solon, OH, or approved equal. Splices shall be installed in compliance with manufacturer's requirements.
 - 3. Mechanical and welded tensile mechanical splicing systems shall be capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength (Type 1) except where indicated as Type 2 (100% of specified tensile strength).
 - 4. Mechanical compression splices shall be such that the compression stress is transmitted by end bearing held in concentric contact.
- C. Headed Bars:
 - 1. For bar sizes #11 (#36) or smaller where specifically detailed on Drawings, mechanical bar terminators shall be used.
 - 2. Acceptable Products: Bartec End Anchors by Dextra, Santa Fe Springs, CA or Lenton Terminator by Erico, Solon, OH or Grip-Twist Doughnut by Bar-Splice, Dayton, OH or Bar Lock End Anchorage System by Dayton Superior, Miamisburg, OH, or approved equal.
- D. Supports for Reinforcement:
 - 1. Types: Bolsters, chairs, spacers, clips, chair bars, and other devices for properly placing, spacing, supporting, and fastening the reinforcement, plastic, plastic protected steel, or epoxy coated to match supported reinforcement.
 - 2. For Contact with Forms: Use types with not less than 3/32" (2.5mm) of plastic between metal and concrete surface.
 - a) Plastic tips shall extend not less than 1/2" (12mm) on metal legs.
 - 3. Individual and continuous slab bolsters and chairs shall be of type to suit various conditions encountered and must be capable of supporting 300 pound (1.5kN) load without damage or permanent distortion.
 - 4. Unless otherwise indicated on Drawings, bottom reinforcing bars in footings shall be supported by precast concrete bricks or individual high chairs with welded sand plates on bottom.
 - 5. For Slabs on Grade: Use supports with sand plates or horizontal runners where base material will not support chair legs.
- E. Deformed Bar Anchors:
 - 1. Type: Automatic end welded, ASTM A 496 quality.
 - 2. Size and Grade: As indicated on structural Drawings.
- F. Anchor rods and dowels:
 - 1. Types and Sizes: Provide sizes and types of anchor rods and dowels as indicated on the Drawings. Each type of anchor shall be manufactured of structural quality steel, designed for cast-in-place concrete applications and be of sizes as indicated on Drawings, complete with washers, nuts, plates and miscellaneous accessories required to meet Contract Document requirements.
 - 2. Adhesive Anchors for anchor rods and dowels in existing concrete: See Anchorage Accessories.
- G. Prefabricated Bent-In Dowel Keyway System:

1. Type, Size and Grade as indicated on Drawings.
2. Acceptable Products: Lenton Form Savers by Erico, Solon, OH or Stabox by Meadow Burke, Tampa, FL or Metalstrip by Dayton Superior, Miamisburg, OH, or approved equal.
3. Installation: Per Manufacturer's instructions.

2.03

ANCHORAGE ACCESSORIES

- A. General: Miscellaneous anchorage accessories for anchoring structural, architectural, electrical, and mechanical items to poured concrete shall include but not be limited to the following:
1. Concrete Anchors: Headed or bent studs ASTM A 108/Grade 1015 through 1020, minimum yield strength of 50,000 psi (345MPa), minimum tensile strength of 60,000 psi (415MPa).
 2. Anchor Rods: ASTM F1554, Grade as noted on Drawings.
 3. Threaded Inserts: Manufactured by Dayton/Richmond Screw Anchor Co. or Powers Fasteners, Inc., or approved equal.
 4. Adhesive Anchors:
 - a) Basis of Design: As anchor capacities vary by manufacturer, the following anchors or approved equal will be considered.
 - i. HIT-RE 500-SD by Hilti, Inc., Tulsa, OK
 - ii. Epcon C6+ by ITW Red Head, Glendale Heights, IL
 - iii. Epcon G5 by ITW Red Head, Glendale Heights, IL
 - iv. PE 1000+ by Powers Fasteners, Brewster, NY
 - v. Pure 110+ by Powers Fasteners, Brewster, NY
 - vi. SET-XP by Simpson Strong-Tie Co., Pleasanton, CA
 - b) The adhesive anchor system used for post-installed anchorage to concrete shall conform to the requirements of ACI 308.4 and commentary and shall possess a current ICC-ES report demonstrating compliance with ACI 308.
 5. Expansion Anchors:
 - a) Basis of Design: As anchor capacities vary by manufacturer, the following anchors or approved equal will be considered.
 - i. Power Stud+ SD1 or SD2 by Powers Fasteners, Brewster, NY
 - ii. Power Stud + SD6 (SS) by Powers Fasteners, Brewster, NY
 - iii. Trubolt or Trubolt+ by ITW Red Head, Glendale Heights, IL
 - iv. Strong-Bolt by Simpson Strong-Tie Co., Pleasanton, CA
 - b) The expansion anchors used for post-installed anchorage to concrete shall conform to the requirements of ACI 308.2 and commentary and shall possess a current ICC-ES report demonstrating compliance with ACI 308.
 6. Threaded Screw Anchors:
 - a) Basis of Design: As anchor capacities vary by manufacturer, the following anchors or approved equal will be considered.
 - i. Wedge Bolt+ by Powers Fasteners, Brewster, NY
 - ii. Tapcon by ITW Red Head, Glendale Heights, IL
 - iii. Titan HD by Simpson Strong-Tie Co., Pleasanton, CA
 7. Inserts and Coil Rods: Yield strength 65,000 psi (450MPa), ASTM B 633, manufactured by Acrow-Richmond Limited or Dayton Superior, Dayton, OH.
 8. Welding Electrodes: AWS E70, Series E70. Welded Deformed Bar Anchors: Welded by full-fusion process, as furnished by TRW Nelson Stud Welding Division or equivalent.
- B. Dovetail Anchor Slots:
1. Type: Formed 22 gauge (0.85mm) galvanized steel manufactured by Heckmann Building Products, Chicago, Illinois or Hohmann and Barnard, Hauppauge, New York or Pro-Slot by BoMetals, Inc., Carrollton, GA, or approved equal.
 2. Location of Use: Continuous installation of anchor slots, full height of masonry walls, where masonry walls abut poured concrete walls.

3. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
4. Finish: Hot-dip galvanized or zinc-plated steel.
5. Stainless steel anchors are acceptable.

2.04 JOINT FILLERS

- A. Permanent Compressible Joint Filler:
 1. Type: Closed-cell expansion joint filler, ultraviolet stable, minimal moisture absorption, non-impregnated, non-staining and non-bleeding, inert and compatible with cold-applied sealants.
 2. Location of Use: Slabs and curbs as indicated on Drawings or required.
 3. Thickness: As indicated on Drawings or required.
- B. Temporary Compressible Joint Filler:
 1. Type: White molded polystyrene beadboard.
 2. Location of Use:
 - a) In slabs, curbs, and walls which must be removed prior to joint sealant installation.
 - b) Vertically to isolate walls from columns or other walls.
- C. Semi Rigid Joint Filler:
 1. Acceptable Product: Euclid Chemical Company "Euco 700" or "Euco QWIKjoint 200"
 2. Acceptable Product: Sika Corporation "Sikadur 51 SL"
 3. Acceptable Product: W.R. Meadows Sealtight "Rezi-Weld Flex"
 4. Or approved equal
- D. Noncompressible Joint Filler:
 1. Type: Rigid closed-cell extruded polystyrene board, square edges, 40 psi (275kPa) compressive strength, ASTM C 578, Type IV.
 2. Thickness: As indicated on Drawings.
 3. Location of Use: As indicated on Drawings or required.
- E. Asphalt-Impregnated Joint Filler:
 1. Type: Preformed, ASTM D 994.
 2. Thickness: 1/2" (12mm) maximum, as indicated on Drawings or required.
 3. Location of Use: Sidewalks at foundation walls and as indicated on Drawings or required.
- F. Asphalt-impregnated fiberboard expansion joint filler for interior work:
 1. Type: ASTM D1751.
- G. Self-expanding cork board expansion joint filler for exterior work:
 1. Type: ASTM D1752.
- H. Construction Joints:
 1. Type: Tongue and groove type profile of galvanized steel, with knock-out holes at 6" (150mm) on center to receive dowelling, complete with anchorage.

2.05 WATERSTOPS

- A. Preformed Swellable Waterproofing Strips especially formulated for concrete cold joints at footings, walls, or slabs.
 1. Acceptable Products:
 - a) "Volclay Waterstop RX" by CETCO Building Materials Group, Hoffman Estates, IL
 - b) "Adcor ES" by W. R. Grace & Co., Cambridge, MA
 - c) "Hydrotite" by Sika, Lyndhurst, NJ
 - d) Or approved equal

2. Size: 3/4" (20mm) by 3/8" (10mm) strips minimum, 25 ft. (7.5m) long, and weighing at least 0.165 lbs/ft (0.245kg/m).
 3. Location of Use: Concrete cold joints at footings, walls and slab joints.
 4. Comply with manufacturer product application and installation instructions.
- B. Polyvinyl Chloride Waterstops:
1. Type: PVC Waterstops for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections and directional changes. U.S. Corp of Engineers Specification CRD C 572.
 2. Acceptable Products:
 - a) "PVC Waterstops" by BoMetals, Carrollton, GA
 - b) "Greenstreak" by Sika, Lyndhurst, NJ
 - c) "Sealtight PVC Waterstops" by W.R. Meadows, Hampshire, IL
 - d) Or approved equal

PART 3 - EXECUTION

3.01 FABRICATION

- A. Reinforcing Steel Fabrication:
1. Fabricate in accordance with approved shop Drawings, ACI 315 and Contract Documents.
 2. Heating of Reinforcement: Will be permitted only with specific prior approval of the SER.
 3. Welding: Comply with ANSI/AWS D1.4; use E9018 electrodes or approved electrodes.
 4. Tolerances: Comply with ACI 117.
 5. Unacceptable Materials: Reinforcement with any of following defects will not be permitted in Work.
 - a) Bar lengths, depths, and bends exceeding ACI fabrication tolerances.
 - b) Bends or kinks not indicated on Drawings or final shop drawings.
 - c) Bars with reduced cross-section due to excessive rusting or other cause.
- B. Welded Wire Reinforcement:
1. Type: As fabricated in accordance with CRSI, unless otherwise noted.
- C. Templates:
1. Required for all footing and column dowels, and where required for proper alignment of reinforcing.
- D. Assemblies:
1. Fabricate and assemble structural steel items in shop in conformance with AISC and AWS D1.1. Shearing, flame cutting, and chipping shall be done carefully and accurately. Cut, drill, or punch holes at right angles to the surface of the metal. Do not make or enlarge holes by burning. Holes shall be clean-cut without torn or ragged edges.
 2. Welding of deformed bar anchors and headed stud anchors shall be installed by full-fusion process equivalent to TRW Nelson Stud Welding Division or KSM Welding Services Division, Omark Industries or Tru-Weld Stud Welding, Medina, OH.
 3. Welding of reinforcement shall be done in accordance with AWS requirements. Welding shall be performed subject to the observance and testing by Testing Agency.
 4. Galvanizing where required, shall be applied after fabrication and prior to casting concrete.
 5. Welding of crossing bars (tack welding) for assembly of reinforcement is not permitted without use of weldable reinforcement and express written consent of SER.

3.02 INSTALLATION OF REINFORCEMENT

- A. General:

1. Perform the work of this section in accordance with approved shop drawings, ACI 318 and CRSI recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as specified.
 2. Before placing reinforcement steel, inspect forms for proper fitting and compliance with allowable tolerances.
 3. Reinforcement shall be free of form coatings, sealers, powdered and scaled rust, loose mill scale, earth, ice, and other materials which will reduce or destroy bond with concrete.
 4. Do not place concrete until the completed reinforcement steel work has been observed and accepted by Commissioner's Testing Laboratory.
 5. Reinforcement steel is not permitted to be "floated into position".
 6. Bend bars cold.
 - a) Do not heat or flame cut bars.
 - b) No field bending of bars partially embedded in concrete is permitted, unless specifically approved by the SER and tested by Independent Testing Agency for cracks.
 7. Weld only as indicated.
 - a) Perform welding per ANSI/AWS D12.1 and/or ANSI/AWS D1.4.
 - b) See structural Drawings for additional requirements.
 8. Tag reinforcement steel for easy identification.
- B. Placement of Reinforcement Bars:
1. Comply with approved shop drawings, ACI 318 and Contract Documents.
 2. Accurately position, support and secure reinforcement in a manner to prevent displacement before and during placement of concrete.
 - a) Place reinforcement bars within tolerances specified in ACI 117.
 - b) Locate and support reinforcement by metal chairs, runners, bolsters, spacers, hangers and other accessories for fastening reinforcing bars and welded wire reinforcement in place.
 3. If bars are displaced beyond specified tolerance when relocating the bars to avoid interference with other reinforcement or embedded items, notify the Commissioner for approval prior to concrete placement.
 4. Avoid cutting or puncturing vapor retarder during reinforcement placement.
 - a) Repair damages before placing concrete.
 5. Concrete Coverage: Maintain concrete cover around reinforcement as indicated on Drawings.
 6. Bar Supports: Use type specified in this section.
 7. Tie Wires: After cutting, turn tie wires to the inside of section and bend so that concrete placement will not force ends to be exposed at face of concrete.
- C. Placement of Wire Reinforcement:
1. Install in lengths as long as practicable.
 2. Support in position adequately to prevent bending of reinforcement between supports before and during placement of concrete.
 3. Overlap the wire reinforcement 6" (150mm) or one panel width + 2" (50mm), whichever is larger.
 - a) Securely tie together with wire.
 4. Offset laps of adjoining widths to prevent continuous laps in either direction.
 5. Locate wire fabric in the top third of slabs, unless noted otherwise on structural Drawings.
- D. At Construction Joints:
1. Reinforcement bars and wire reinforcement shall be continuous through construction joints, unless otherwise indicated on Drawings. See Drawings for scheduled lap splices.
- E. At Expansion Joints:
1. Reinforcing bars and wire fabric shall NOT be continuous through expansion joints, unless otherwise indicated on Drawings.
- F. Splicing:

1. Unless otherwise indicated on Drawings provide lap splices for bar sizes #11 (ø36) and smaller by lapping ends, placing bars in contact, and tying tightly with wire in accordance with requirements of ACI 318 for lap lengths indicated on Drawings.
 2. At all #14 (ø43) and #18 (ø57) bars and where mechanical splices are specifically indicated on Drawings, comply with requirements specified in this Specification section under "Mechanical Splicing Systems".
 3. Do not splice reinforcement except as indicated on structural Drawings.
 4. Tension couplers may be used and installed per manufacturer's specifications where indicated on Drawings or as approved by Engineer.
- G. Dowels in Existing Concrete:
1. Install dowels and dowel adhesive in accordance with supplier's recommendations.
 2. Minimum embedment length shall be 12 bar diameters, unless noted otherwise.

3.03 INSTALLATION OF POST-INSTALLED ADHESIVE ANCHORS

- A. General:
1. Post-installed adhesive anchors shall be installed in accordance with the Manufacturer's Printed Installation Instructions (MPII).
 2. The adhesive anchors shall be supplied as an entire system. The contractor shall provide all equipment required to install the adhesive anchor in accordance with the MPII.
 3. Anchors shall be installed in holes drilled with a rotary impact hammer drill with carbide bit. Contractor shall obtain written approval from SER prior to using rock drilling or core drilling installation methods.
 4. Anchor holes shall be thoroughly cleaned prior to adhesive injection, in accordance with the MPII. Anchors to be installed in the adhesive shall be clean, oil-free, and free of loose rust, paint, or other coatings.
 5. Concrete shall have a minimum compressive strength of 2500 psi (17MPa).
 6. Concrete at time of adhesive anchor installation shall have a minimum of 21 days.
 7. Concrete temperature at the time of adhesive anchor installation shall be at least equal to manufacture's requirements, or 50° F (10°C) if no requirement exists.
 8. Support the anchor and protect it from disturbance or loading for the full cure time stated by the manufacturer at that base material temperature.
 9. Unless specified otherwise in the contract documents, anchors shall be installed perpendicular to the concrete surface. Anchors displaced or disturbed prior to the adhesive cure time shall be considered damaged and reported to the Commissioner (see Observations and Corrections section of 033000).
 10. Locate, by non-destructive means, and avoid all existing reinforcement prior to installation of anchors. If existing reinforcement layout prohibits the installation of anchors as indicated in the drawings the contractor shall notify the Commissioner immediately.
 11. Reinforcement bars or all-threaded bars shall not be bent after being adhesively embedded in hardened, sound concrete, unless written approval is given by the Commissioner.
 12. All personnel installing anchors shall be trained by the manufacturer on proper installation techniques. Submit for record certificate from training documentation from the manufacturer for each installer on this Project.
 13. Installation of adhesive anchors shall comply with the special inspections required by 2014 New York City Building Code Section 1704.32 and all referenced standards.

3.04 INSTALLATION OF ACCESSORIES

- A. Install concrete accessories in accordance with manufacturer's published instructions and Contract Documents.

1. Set and secure embedments, including embedded plates, bearing plates, and anchor bolts, per approved setting drawings and in such a manner to prevent movement during placement of concrete and to allow removal of formwork without damage.
 2. Inspect locations to receive concrete accessories.
 3. Immediately report to the Commissioner in writing of conditions that will adversely affect the Work or fails to meet Contract Document requirements.
 1. Do not place concrete until reinforcement, accessories and other built-in items have been inspected and accepted by Testing Agency.
- B. Construction and Contraction (Control) Joints:
1. Construction and contraction (control) joints indicated on Drawings are mandatory and must not be omitted.
 - a) Provide construction joints in accordance with ACI 318.
 - b) Roughen surface at construction joints as indicated on the drawings.
 - c) Where specifically indicated on drawings, provide 1-1/2" (40mm) deep key type construction joints at end of each placement for slabs, beams, walls and footings.
 - i. Bevel forms for easy removal.
 2. Provide waterstops in construction joints as indicated on the Contract Documents in sizes to suit joint.
 3. Install waterstops to form continuous diaphragm in each joint.
 4. Support and protect exposed waterstops during progress of Work.
 5. Field-fabricate joints in waterstops according to manufacturer's printed instructions.
- C. Coordinate the installation of pipes, bolts, hangers, anchors, flashing and other embedded items with the work of other trades.

END OF SECTION

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SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 GENERAL

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract.

1.02 SCOPE

- A. Provide all labor, materials, equipment, services and transportation required to complete all concrete work as shown on Drawings, as specified herein, and as required by the job conditions. This Specification is not intended to address the particular requirements of Architectural Concrete.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Submittals DDC General Conditions
- B. Quality Control DDC General Conditions
- C. Concrete Formwork Section 031000
- D. Concrete Reinforcement and Embedded Assemblies Section 032000
- E. Thermal and Moisture Protection Division 7

1.04 CODES AND STANDARDS

- A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.
- B. Standards:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 237 - Self Consolidating Concrete.
 - 3. ACI 301 - Specifications for Structural Concrete.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
 - 5. ACI 212 - Report on Chemical Admixtures for Concrete
 - 6. American Concrete Institute "Manual of Concrete Practice", various committee reports as referenced herein.
 - 7. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein.
 - 8. AASHTO T318 - Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

1.05 SUBMITTALS

- A. Required Submittals - Where the SUBMITTALS section of this Specification is in conflict with DDC General Conditions, the more stringent requirements for the Contractor apply. Required submittal

items are listed here; see below for detailed requirements. Do not submit items not requested. Reproduction of structural drawings for shop drawings is not permitted. Building Information Models for contractor's use may be provided as mutually agreed upon by the Commissioner.

- (1) Submittal Schedule
- (2) Mix Designs
- (3) Hot and Cold Weather Procedures
- (4) Product Data
- (5) Concrete Joint Locations
- (6) Preconstruction Survey
- (7) Survey of Flat Plate or Flat Slab Concrete Floors during construction
- (8) Survey of As-built Floor Conditions
- (9) Survey of As-built Column and Wall Conditions
- (10) Structural Repairs
- (11) Patching Defective Concrete Finishes
- (12) Conduit and Pipes Embedded in Concrete
- (13) Hazardous Materials Notification

1. **Submittal Schedule:** The contractor shall submit for approval a schedule at least twenty (20) working days prior to commencing submittals.
 - a) This schedule shall include a list, in order of date to be submitted, of all drawings and other required submittal items scheduled to be submitted. The schedule shall list the proposed submittals for each week, as well as their formats. Once shop drawing submissions have commenced any modification or addition to this schedule must be submitted for approval at least twenty (20) working days before the modification or addition is proposed to take place.
 - b) If at any time the total number of shop drawings received in any one week period exceeds the amount in the approved schedule by more than 10% for that week, the Commissioner has the right to add two days to the average turnaround time for each 20% increment in excess of the scheduled quantity for that week's submissions. For example if the weekly total exceeds the schedule by 10% to 20%, two days may be added; if it is exceeded by 21% to 40%, four days may be added. The return dates for subsequent submittals may be extended based on the additional review time stated above.
 - c) For the purposes of developing a schedule, assume the following review rate, Shop drawings - 10 full size sheets per week.
2. **Mix Designs:** Submit concrete mix designs for each type and strength of concrete required for this Project at least thirty (30) days before placing concrete.
 - a) Mix designs shall be prepared or reviewed by an approved independent Testing Agency retained by the Contractor in accordance with requirements of ACI 301 and ACI 318, signed by a registered Design Professional licensed to practice as a Professional Engineer in NY State, and shall be coordinated with design requirements and Contract Documents.
 - b) Before submitting to Testing Agency, submit complete mix design data for each separate mix to be used on the Project in a single submittal.
 - c) Provide a completed "Concrete Mix Design Submittal Form" for each proposed concrete mix.
 - d) Data shall be from the same production facility that will be used for this Project.
 - e) Mix Design data shall include but not be limited to the following:
 - i. Locations on the Project where each mix design is to be used corresponding to Structural General Notes on the Drawings.
 - ii. Design Compressive Strength: As indicated on the Drawings.
 - iii. Proportions: ACI 301 and ACI 318.
 - iv. Gradation and quality of each type of ingredient including fresh (wet) unit weight, aggregates sieve analysis.
 - v. Water/cementitious material ratio.
 - vi. Evaluate and classify fly ash in accordance with ASTM D 5759.
 - vii. Report chemical analysis of fly ash in accordance with ASTM C 618.

- viii. Classify blast furnace slag in accordance with ASTM C 989.
 - ix. Slump: ASTM C 143.
 - x. Certification and test results of the total water soluble chloride ion content of the design mix - AASHTO T260 or ASTM C 1218.
 - xi. Air content of freshly mixed concrete by the pressure method, ASTM C 231, or the volumetric method, ASTM C 173.
 - xii. Unit Weight of Concrete: ASTM C 138.
 - xiii. Design strength at 28, 56 or 90 days, as indicated on Contract Documents: ASTM C 39.
 - (1) Document strength based on basis of previous field experience or trial mixtures per ACI 301. Proportioning by Water-Cement Ratio is not permitted.
 - (2) Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard deviation calculation, and determination of required average compressive strength.
 - (3) If early concrete strengths are required, Contractor shall submit trial mixture results as required.
 - xiv. Test records to support proposed mixtures shall be no more than 24 months old and use current cement and aggregate sources. Test records to establish standard deviation may be older if necessary to have the required number of samples.
 - xv. Manufacturer's product data for each type of admixture.
 - xvi. Manufacturer's certification that all admixtures used are compatible with each other.
 - xvii. All information indicating compliance with Contract Documents including method of placement and method of curing.
 - xviii. Normalweight Concrete: Density per ASTM C 138. Design the mix to produce the strength, modulus of elasticity and density as indicated on the Contract Documents.
 - xix. Lightweight Concrete: Density per ASTM C 138. Design the mix to produce the strength, modulus of elasticity and density as indicated on the Contract Documents.
 - (1) Where lightweight concrete members are used, provide split cylinder strength factor, f_{ct} , as indicated.
 - xx. Certification from a qualified testing agency indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity in accordance with ASTM C 33
3. **Hot and Cold Weather Procedures:** Submit for record to the Commissioner the written procedures for placement of concrete in hot and cold weather conditions. Hot and Cold weather are as defined in the Concrete Placement section of this Specification.
4. **Product Data:** Submit product data clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published application instructions, product characteristics, compatibility and limitations for each of the following:
- a) Bonding agents.
 - b) Curing compound and liquid sealer densifier. Submit for record to Commissioner a written statement guaranteeing that the compound will not leave discoloration on concrete to be left exposed, or affect the bond for paint or other applied finishes. Include provision in written statement that in the event of failure of applied finishes to bond to membrane cured concrete, to remove the curing compound and leave suitable surfaces for bonding such finishes.
 - c) Absorptive covers and moisture retaining covers.
 - d) Vapor Retarder: See Division 7, Thermal and Moisture Protection.
 - e) Self-leveling concrete topping.

- f) Grout: Submittal of Grout not by manufacturers listed herein must be accompanied by independent certification of ASTM C 1107 compliance without modification of standard methods.
 - g) Other products proposed by Contractor
5. **Concrete Joint Locations:** Submit plans indicating locations and details of construction joints, contraction joints, waterstops, sleeves, embedments, etc. that interact with the joints. Contractor to coordinate joint location with reinforcement shop drawings. Reinforcement shop drawings shall indicate additional reinforcement bars where required at construction joints. Joint locations for concrete slabs to receive a terrazzo or similar finish subject to reflective cracking must be coordinated with layout of finish drawings.
6. **Preconstruction Survey:** Submit for record. Where interface with existing construction occurs, before related shop drawings are prepared survey the existing construction and submit the survey prepared by a professional surveyor employed by the Contractor to the Commissioner.
7. **Survey of Flat Plate or Flat Slab Concrete Floors during construction:** Submit for record. Survey requirements are described on Drawings. Based on survey results, Commissioner may propose adjustments to formwork and camber.
8. **Survey of As-built Floor Conditions:** Submit for record. Survey and report flatness (F_p), levelness (F_L), and final elevations of finished floors prior to shoring removal. For slabs that include camber, do not test for levelness (F_L). Perform F_p/F_L testing in accordance with ASTM E 1155 requirements.
9. **Survey of As-built Column and Wall Conditions:** Submit for record. Survey requirements are described on Drawings. Based on survey results, Commissioner may recommend adjustments to account for differential shortening.
10. **Structural Repairs:** Submit procedures and product information. Alterations to design shall be signed & sealed by a licensed Professional engineer in the state of New York.
11. **Patching Defective Concrete Finishes:** Submit procedures and product information.
12. **Conduit and Pipes Embedded in Concrete:** Submit for approval layout of embedded conduit and pipes.
13. **Hazardous Materials Notification:** Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Commissioner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- B. Submittal Process
- 1. Submittal of shop drawings and other submittals by the Contractor shall constitute Contractor's representation that the Contractor has verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each drawing with other Drawings and other trades. The Contractor shall place their shop drawing stamp on all submittals confirming the above.
 - 2. Shop drawings: Submit in complete packages so that individual parts and the assembled unit may be reviewed together. This Specification Section and the applicable Drawings used in the development of the shop drawings shall be referenced on each shop drawing to facilitate checking.
 - 3. The Contractor shall submit to the Commissioner one (1) electronic copy or shop drawing review. If the Contractor and Design Team agree to process shop drawings electronically, Contractor shall submit one hardcopy and one electronic copy to the Commissioner. The naming convention of each drawing must follow the submittal numbering system and include the submittal number, Specification number, revision number and drawing number in the prefix of the drawing name.
 - 4. The Contractor shall allow at least ten (10) working days between receipt and release by the Commissioner for the review of shop drawings and submittals.
 - 5. All modifications or revisions to submittals and shop drawings must be clouded, with an appropriate revision number clearly indicated. The following shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Commissioner:

- a) Failure to specifically cloud modifications
 - b) Unapproved revisions to previous submittals
 - c) Unapproved departure from Contract Documents
6. Resubmittals: Completely address previous comments prior to resubmitting a drawing. Resubmit only those drawings that require resubmittal. Do not include new content not previously reviewed.
7. Resubmittals Compensation: The Contractor shall compensate the Commissioner for submittals that must be reviewed more than twice due to Contractors' errors. The Contractor shall compensate the Commissioner at standard billing rates plus out-of-pocket expenses incurred at cost + 10%.
8. The Contractor shall deliver to the Commissioner at the completion of the job two (2) copies of the electronic version of the final as-built shop drawings on a CD-ROM or other media acceptable to the Commissioner.

C. Commissioner Submittal Review

1. The Commissioner's review and approval of shop drawings and other submittals shall be for general conformance with the design intent of the work and with the information given in the Contract Documents only and will not in any way relieve the Contractor or the Contractor's Engineer from:
- a) Conforming to the Contract Documents.
 - b) Coordination with other trades.
 - c) Responsibility for all required detailing and proper fitting of construction work.
 - d) The necessity of furnishing material and workmanship required by Drawings and Specifications which may not be indicated on the shop drawings.
 - e) Control or charge of construction means, methods, techniques, sequences or procedures, for safety precautions and programs in connection with the work.
2. TYPE 1 Stamp - For shop drawings for building elements designed by the Commissioner, the responses on the shop drawing review stamp used by the Commissioner require the following actions:
- a) APPROVED indicates that the Commissioner has found that the information presented on the shop or erection drawing appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b) APPROVED AS NOTED indicates that the Commissioner requires the shop or erection drawing to be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected shop or erection drawing for record.
 - c) REVISE and RESUBMIT indicates that the Commissioner requires resubmission of the shop or erection drawing after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
 - d) NOT APPROVED indicates that the shop or erection drawing does not conform to the Contract Documents and must be extensively revised before re-submittal. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
3. TYPE 2 Stamp - For submittals for building elements which are not designed by the Commissioner but are performance specified, for items that do not form part of the completed structural system but impose loads on the structure, and for construction items or activities which have an effect on the final structure, a second stamp will be used. The responses on the stamp used by the Commissioner require the following actions:

- a) NO EXCEPTION TAKEN indicates that the Commissioner has found that the information presented on the submittal appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
- b) EXCEPTIONS NOTED indicates that the Commissioner requires the submittal be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected document for record.
- c) REJECTED indicates that the Commissioner requires resubmission of the submittal after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed. Contractor to revise and resubmit until Commissioner response of No Exceptions or Exceptions Noted is received.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with DDC General Conditions.
- B. Storage:
 - 1. Store materials in accordance with ACI 304R.
 - 2. Store cement in weather-tight buildings, bins or silos that will exclude moisture and contaminants.
 - 3. Store admixtures to avoid contamination, evaporation, damage, and in accordance with manufacturer's temperature and other recommendations.
 - 4. Keep packaged material in original containers with seals unbroken and labels intact until time of use.
- C. Handling:
 - 1. Handle fine and coarse aggregates as separate ingredients.
 - 2. Arrange aggregate stockpiles to avoid excessive segregation, and prevent contamination with other materials or with other sizes of like aggregates.
 - 3. Do not use frozen or partially frozen aggregates.
 - 4. Allow sand to drain until it has reached relatively uniform moisture content before use.
 - 5. Protect liquid admixtures from freezing and temperature changes that would adversely affect characteristics, and in accordance with manufacturer's recommendations.

1.07 PRE-INSTALLATION CONFERENCE

- A. At least 30 working days prior to the start of concrete construction, the Contractor shall hold a meeting to review the approved concrete mix designs and to determine the procedures for producing proper concrete construction. The Contractor shall notify the Commissioner of the meeting and require responsible representatives of every party who is concerned with the concrete Work to attend the conference, including but not limited to the following:
 - 1. Contractor.
 - 2. Testing Agency representative
 - 3. Concrete Subcontractor.
 - 4. Ready-mix concrete producer.
 - 5. Admixture manufacturer(s).
- B. Minutes of the meeting shall be recorded and distributed by the Contractor to all parties concerned within five working days of the meeting. One copy of the minutes shall also be furnished to the following:
 - 1. Commissioner.

- C. The minutes shall include a statement by the concrete contractor and admixture manufacturer(s) indicating that the proposed mix design and placing, finishing, and curing techniques can produce the concrete properties and quality required by these Specifications.

1.08 QUALITY ASSURANCE BY TESTING AGENCY

- A. Quality assurance is testing and inspection to assist the Commissioner in evaluating the Contractor's performance.
- B. Coordination with Testing Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are provided. The Contractor shall cooperate fully with the Commissioner's Testing Agency in the performance of their work and shall provide the following:
 - 1. Information as to time of starting field construction and concrete placement schedule, one week prior to the beginning of the work
 - 2. Site File: At least one copy of each approved shop drawing shall be kept available in the Contractor's field office. Drawings not bearing evidence of approval and release for construction by the Commissioner shall not be kept on the job.
 - 3. Full and ample means of assistance for testing and inspection of material
 - 4. Proper facilities, including scaffolding, temporary work platforms, safety equipment etc., for inspection of the work in shop and field
- C. Field Quality Assurance
 - 1. General: The Testing Agency shall test and inspect concrete materials and operations as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Commissioner for final acceptance.
 - 2. Testing Agency shall conduct tests of concrete as follows and in accordance with ASTM C 1077:
 - a) Testing frequency: Sample sets for all tests listed below of each concrete design mix placed each day shall be taken not less than once a day, nor less than once for each 50 cubic yards (40 cubic meters) of concrete, nor less than once for each 2500 square feet (250 square meters) of surface area for slabs or walls. Additional tests shall be performed if deemed necessary by the Testing Agency and Commissioner. In addition, sample each truckload used for columns, regardless of other frequencies listed above.
 - b) Obtain each test sample from different batches selected on a strictly random basis before commencement of concrete placement. Record location in structure of sampled concrete.
 - c) Determine air content of normalweight concrete in accordance with either ASTM C 231 or ASTM C 138. Determine air content of lightweight concrete in accordance with ASTM C 173.
 - d) Determine unit weight of normalweight concrete in accordance with ASTM C 138 and lightweight concrete in accordance with ASTM C 567.
 - e) Conduct one test for air content for each strength test required or for every 50 cubic yards (40 cubic meters) of fly ash concrete placed, whichever is less. Test in accordance with ASTM C 173 or ASTM C 231.
 - f) The water content of freshly mixed concrete will be tested on a random basis, a minimum of once per 100 cubic yards (75 cubic meters) or every 5000 square feet (500 square meters) of concrete placement, during placement in accordance with AASHTO T 318 for the following concrete types:
 - i. Architecturally exposed hard troweled slabs
 - ii. Slab to receive a bonded finish floor material
 - iii. Slabs with specified concrete compressive strength exceeding 6000 psi (42MPa)
 - g) Conduct slump tests in accordance with ASTM C 143.
 - h) Conduct slump tests for concrete enhanced with high-range water-reducing admixtures as follows:

- i. Concrete with plant added high-range water-reducing admixtures shall be sampled immediately upon arrival at job site. Batches delivered to site with slumps in excess of the range defined in the mix design submittal or with excessive segregation as defined in the ACI Manual of Standard Practice Part I shall be rejected.
- ii. Concrete with site added high-range water-reducing admixtures shall be sampled immediately upon arrival at job site and after addition of high-range water-reducing admixtures for conformance to initial water slump and final slump requirements.
- iii. Concrete shall also be sampled at point of initial discharge for conformance to slump and/or slump-flow requirements. Visually observe slump-flow at point of concrete placement. If slump loss is visually observed to exceed the range specified for mix design, perform additional slump test at point of discharge from concrete pump hose.
- i) Conduct slump tests for Self Consolidating Concrete (SCC) as follows
 - i. In accordance with ACI 237, where SCC is used, perform slump flow and visual stability index tests in accordance with ASTM C1611 on the first batch of SCC, and then consecutive batches until two consecutively produced batches are within specification. SCC with a visual stability index value of 2 or 3 shall be stabilized, where possible, with a viscosity modifying admixture or rejected at the discretion of the Engineer and Ready Mix Quality Control Representative. The Ready Mix Producer shall be responsible for adjusting the mix to provide desired flow and stability. After establishing the consistency of the SCC mix, testing shall continue in accordance with the requirements of the above paragraph.
 - ii. In accordance with ACI 237, where SCC is used, perform slump flow tests in accordance with ASTM C1621 using a J-ring to determine the passing ability of the SCC mix around reinforcement. If the reinforcing bars retain the coarse aggregates inside the ring, the mixture has a high potential for blocking and should be reportioned at the direction of the Engineer and Ready Mix Quality Control Representative.
- j) Conduct strength tests of concrete as follows:
 - i. Secure sample sets in accordance with ASTM C 172.
 - ii. Mold cylinders in accordance with ASTM C 31 and cure under standard moisture and temperature conditions in accordance with ASTM C 31, Section 7 (a). Quantity of cylinders listed below is based on a cylinder size of 4 inch (100mm) diameter x 8 inches (200mm) long. If 6 inch (150mm) diameter by 12 inch (300mm) long cylinders are used, the total quantity of cylinders may be reduced by one with two cylinders instead of three tested at the age designated for determination of f'_c .
 - iii. Test cylinders in accordance with ASTM C 39. For specified concrete strength of 10,000 psi (70MPa) and above, cylinders shall be ground and not capped.
 - iv. For 28 day mixes mold six cylinders. Test two cylinders at seven days and three cylinders at 28 days. The 28 day strength shall be the average of the three 28 day cylinders. One cylinder shall be retained in reserve for later testing if required.
 - v. For 56 day mixes mold seven cylinders. Test one cylinder at seven days, two cylinders at 28 days, and three cylinders at 56 days. The 56 day strength shall be the average of the three 56 day cylinders. One cylinder shall be retained in reserve for later testing if required.
 - vi. For 90 day mixes mold eight cylinders. Test one cylinder at seven days, one at cylinder at 28 days, two cylinders at 56 days, and three cylinders at 90 days. The 90 day strength shall be the average of the three 90 day cylinders. One cylinder shall be retained in reserve for later testing if required.
 - vii. When high early strength concrete is required by Contractor, additional cylinders shall be made and tested as required at Contractor's expense.

- viii. If one cylinder in a test manifests evidence of improper sampling, molding or other damage, discard cylinder and base test results on that of remaining cylinder.
- 3. Floor flatness and levelness tolerance compliance testing is to be performed within 72 hours of concrete placement by Testing Agency, and prior to the removal of shores and forms.
- D. Immediately report deficiencies to the Contractor and the Commissioner.

1.09 QUALITY ASSURANCE BY CONTRACTOR

- 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. Contractor's Testing Agency Services: Required as specified in DDC General Conditions, and herein.
- C. Materials and installed work may require testing and retesting at any time during progress of work, as directed by Commissioner. Tests, including retesting of rejected materials for installed work will be done at Contractor's expense.

1.10 QUALITY CONTROL BY CONTRACTOR

- A. The Contractor shall provide a program of quality control to ensure that the minimum standards specified herein are attained.
- B. The Commissioner's general review during construction and activities of the Testing Agency are undertaken to inform the Commissioner of performance by the Contractor but shall in no way replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.
- C. The Contractor shall immediately report to the Commissioner any deficiencies in the work which are departures from the Contract Documents. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Commissioner. After proposed corrective action is accepted by the Commissioner, the Contractor shall correct the deficiency at no cost to the City of New York.
- D. Where SCC is used, the Ready Mix Producer shall have a Quality Control Representative on site during placements until mix consistency and stability is established.

1.11 OBSERVATIONS AND CORRECTIONS BY COMMISSIONER

- A. Review: The Commissioner will observe the construction for general compliance with the provisions of the Contract Documents during various phases of construction.

1.12 PERMITS AND WARRANTY

- A. Permits: The Contractor shall apply for, procure, renew, maintain, and pay for all permits required by City of NY, State of NY, or other governing authorities, necessary to execute work under this Contract. Contractor shall furnish copies of all permits to the Commissioner.
- B. Warranty: Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:
 - 1. Oily, waxy or loose residue which may interfere with the bonding or discoloration of various applied Architectural finish materials.
 - 2. Discoloration of concrete surfaces scheduled to remain exposed as a finish.
 - 3. Areas which show surface failure or defects.

4. Areas which puddle water.
5. Areas which are not properly prepared to receive Architectural finish materials. If necessary, the Contractor, at his own expense, shall have the Commissioner's Testing Agency perform appropriate tests for bond and discoloration.
6. Patches that become crazed, cracked or sound hollow when tapped.
7. Self-leveling concrete topping that has cracked, spalled and/or not performed in accordance with manufacturer's design criteria.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS & PRODUCTION

- A. Portland Cement:
 1. ASTM C150, Type I or Type II
 2. ASTM C150, Type III, High-early Strength Portland Cement may be used subject to review and approval of Structural Engineer. The specified 28-day concrete compressive strength shall occur within 7 days for concrete using Type III Portland Cement.
 3. ASTM C150, Type V
 4. Provide the same brand of Portland Cement produced in the United States from a single source throughout the project, as required to meet the Commissioner's requirements.
 5. Provide Portland Cement that is uniform in color.
- B. Aggregates for Normalweight Concrete:
 1. ASTM C 33
 2. Fine Aggregate: Natural sand, or sand prepared from stone or gravel, clean, hard, durable, uncoated and free from silt, loam and clay.
 3. Provide aggregates from a single source throughout the project for exposed concrete.
 4. The acceptability of aggregates for the work will depend on proof that their potential alkali reactivity is not deleterious to the concrete.
 5. Do not use fine or coarse aggregates that contain substances that cause spalling.
 6. Maximum coarse aggregate size shall conform to the requirements as specified in ACI 301 but shall not exceed the following:
 - Size no. 57 (25mm max) for footings, drilled piers and caissons
 - Size no. 67 (20mm max) for all other locations
 - Size no. 467 or 457 for non-reinforced concrete at locations noted on Drawings.
 7. Contractor shall furnish concrete with maximum 3/8" (10mm) aggregate at no additional cost to the Commissioner if areas of high reinforcement density require it for placement and consolidation.
- C. Aggregates for Lightweight Concrete:
 1. ASTM C 330.
 2. Classification of Aggregates: As required to meet the Commissioner's requirements.
 3. Provide aggregates from a single source throughout the project for exposed concrete.
 4. Aggregate shall contain the minimum absorbed moisture content recommended by the manufacturer for the project prior to batching.
 5. Maximum coarse aggregate size shall conform to the requirements as specified in ACI 301 but shall not exceed 3/4" (20mm)
- D. Water: ASTM C 94. Clean, and free from injurious amounts of oil, acids, alkali, salts, organic material, or other deleterious materials.
- E. Supplementary Cementitious Material
 1. Fly Ash:
 - a) ASTM C 618, Class C or Class F.
 - b) Shall not be used unless part of an approved mix design.

- c) Limit Loss on Ignition to 2.5%
 - 2. Ground Granulated Blast-furnace Slag (GGBFS)
 - a) ASTM C 989.
 - b) Shall not be used unless part of an approved mix design.
 - 3. Silica Fume (Microsilical):
 - a) ASTM C 1240
 - b) Acceptable Product: W. R. Grace "Force 10,000 D"
 - c) Acceptable Product: Euclid Chemical Company "Eucon MSA"
 - d) Acceptable Product: BASF "MasterLife SF 100"
 - e) Acceptable Product: Sika Corporation "Sikacrete 950 DP"
 - f) Or approved equal
 - 4. Supplementary cementitious materials shall constitute the following of all cementitious materials based on dry weight basis. Supplementary cementitious materials include cenospheres, coal fly ash, GGBFS, and/or silica fume:
 - a) Foundations - 40%
 - b) Precast Concrete - 25%
 - c) Walls and Slabs - 25%
 - 5. For concrete subject to Exposure Class F3 conditions as defined in ACI 318, Table 4.2.1, limit the maximum content of supplementary cementitious materials to values shown in ACI 318, Table 4.4.1.
 - 6. The exact percentages used shall be based on successful test placement on site. Resubmit mix design if percentages change based on test placement.
 - 7. The fly ash or natural pozzolan supplier shall have an effective quality control program in place to guard against contamination of the fly ash and assure compliance with Specifications.
 - 8. Fly ash and GGBFS used shall be from one source throughout the project. Substitution of sources will be acceptable only if testing of concrete mixes containing the substituted material show similar test results and if the color of concrete produced with the substituted material matches the color of previously poured concrete to the satisfaction of the Commissioner.
- F. Ready Mixed Concrete:
 - 1. Shall be batch-mixed and transported in accordance with ASTM C 94.
- G. Self-Consolidating Concrete:
 - 1. Produce in accordance with ACI 237R.
 - 2. Perform the following tests and provide report prior to submitting mix design:
 - a) Resistance to Segregation: Achieve a maximum static segregation percentage of 15% when tested according to ASTM C 1610 with a VSI index of 1 maximum.
 - b) Slump Flow: ASTM C 1611 within a range of 20"-30" (500mm-750mm).
 - c) Passing Ability: ASTM C 1621 with a maximum difference of 2" (50mm) between testing with and without the J-Ring.

2.02 CONCRETE MIX DESIGN

- A. Concrete Strength:
 - 1. Shall be as indicated on the Structural Drawings
- B. Concrete Density (Unit Weight):
 - 1. Shall be as indicated on the Structural Drawings
- C. Air Entrainment
 - 1. For concrete exposed to freeze/thaw cycles and/or deicing chemicals (Exposure Classes F1, F2, F3), and concrete intended to be watertight, provide entrained air content of $6\% \pm 1.5\%$, unless specified otherwise. This includes, but is not limited to, concrete at the following locations:

- a) Concrete at the exterior of the structure with at least one surface exposed to weather, such as exterior face of grade beams, foundation walls, exterior walls and parapets, exposed columns and spandrel beams. .
 - b) Concrete in parking garages.
 - c) Ramps and loading docks.
 - d) Balconies and terraces with no waterproof membrane.
 2. For lightweight concrete less than 120 pcf (19 kN/m³) density, air content may be up to 7% regardless of exposure condition.
 3. For concrete with a specified compressive strength (f'c) greater than 5000 psi (35MPa), required air content may be reduced to 5% ± 1.5%.
 4. Entrained air content noted above shall occur at point of delivery.
 5. No entrained air content is required in concrete placed in the foundation with no surface exposed to weather.
 6. All topping slabs shall have a maximum air content of 3%.
 7. All interior steel trowel finished, normalweight slabs shall have a maximum air content of 3%.
- D. Water-Cementitious Materials (W/cm) Ratio for Normalweight Concrete
1. Unless lower limits are stated in the Contract Documents, all concrete exposed to freezing and thawing in moist condition (Exposure Classes F1 and F2) and/or required to be watertight shall have a maximum W/cm ratio of 0.45 and a minimum f'c=4500 psi .
 2. All concrete exposed to deicing salts, brackish water seawater or spray from these sources [Exposure Class F3] shall have a maximum W/cm ratio of 0.40 and a minimum f'c=4500 psi.
 3. All topping slabs shall have a maximum W/cm ratio of 0.40 and a minimum f'c = 6000 psi.
 4. Absent the above conditions, all concrete with required strength of 4000 psi (28MPa) or higher shall have a maximum W/cm ratio of 0.50.
 5. The water-cementitious materials ratio shall not exceed values indicated, including any water added to meet specified slump in accordance with the requirements of ASTM C 94.
 6. Weight of fly ash or pozzolanic admixtures shall be included with the weight of cementitious materials used to determine the water-cementitious materials ratio.
- E. Slump
1. Concrete design mixes shall be proportioned to meet the following slump limitations. Slump should be measured as described in the testing agency responsibilities:
 - a) Concrete with high range water-reducing admixture: Concrete slump prior to addition of high range water-reducing admixture shall not exceed 3" (75mm) for normalweight concrete and 4" (100mm) for lightweight concrete. After addition of water-reducing admixture, the concrete shall have a maximum slump of 9" (225mm) unless otherwise approved by the Commissioner.
 - b) Concrete without a water-reducing admixture: Slump shall not exceed 4".
- F. Self-Consolidating Concrete Slump/Flow: Use for architectural concrete and heavily reinforced areas where indicated on the plans, and where conventional mixtures do not provide adequate consolidation. Minimum slump/flow diameter of 20" (500mm) or as required by the successful test placement onsite, which shall verify proper workability, finish, and setting time. All self-consolidating concrete shall contain the specified high range water-reducing admixture. All self-consolidating concrete shall contain viscosity modifying admixture as required unless proper quantity and grading of fines can be achieved.
- G. Chloride Ion Content
1. The total water-soluble chloride ion content of the mix including all constituents shall not exceed the limits defined in ACI 318 4.3 unless corrosion inhibiting admixtures are added to the mixture to offset the additional chloride.
 2. If the specified level of water-soluble chloride ion content cannot be maintained, appropriate level of corrosion inhibiting admixture shall be added to the mix in accordance with the manufacturer's recommendation to offset the excess amount of chloride at no additional cost to the City of New York.

H. Form TR-3: 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 TR-3: 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.

2.03 ADMIXTURES

A. General:

1. Admixtures specified below can be used only when established in the mix design with Commissioner' prior written approval.
2. Each admixture approved by Commissioner shall be used in strict compliance with manufacturer's published instructions.
3. Concrete supplier shall certify all admixtures to be compatible with each other. [See Submittals Section in Part 1].
4. All concrete curing compounds and concrete surface retarders shall meet, at a minimum, all federal and state requirements for volatile organic compounds (VOC's). Per NYC EPP Minimum Standards for Construction Projects, the maximum concentration of VOC shall not exceed 350 grams per liter.

B. Air Entraining Admixture:

1. ASTM C 260
2. Acceptable Product: BASF "MasterAir AE 200" or "MasterAir -AE 90"
3. Acceptable Product: W. R. Grace "Darex Series" or "Daravair Series"
4. Acceptable Product: Euclid Chemical Company "AEA -92 or Air 40"
5. Acceptable Product: Sika Corporation "Sika Air Series" or "Sika AEA Series"
6. Or approved equal

C. Water-Reducing Admixture:

1. ASTM C 494, Type A
2. Acceptable Product: BASF "MasterPozzolith 210"
3. Acceptable Product: Euclid Chemical Company "EUCON NW" or "EUCON WR 91"
4. Acceptable Product: W. R. Grace "WRDA" Series, Zyla Series or "Mira" Series
5. Acceptable Product: Sika Corporation "Plastocrete Series"
6. Or approved equal

D. Retarding Admixture:

1. ASTM C 494, Type B
2. Acceptable Product: BASF "Masterset R 100"
3. Acceptable Product: Euclid Chemical Company "EUCON RETARDER 100"
4. Acceptable Product: W. R. Grace "Daratard 17"
5. Acceptable Product: Sika Corporation "Plastiment Series"
6. Or approved equal

E. Non Corrosive Accelerating Admixture:

1. ASTM C 494, Type C
2. Acceptable Product: BASF "POZZUTEC 20" or "Masterset NC 534"
3. Acceptable Product: Euclid Chemical Company "ACCELGUARD 80", "ACCELGUARD NCA" or "ACCELGUARD 90"
4. Acceptable Product: W. R. Grace "Daraset" Series, "Polarset", or "DCI"
5. Acceptable Product: Sika Corporation "Sikaset NC" or "Plastocrete 161 FL" or "Sika Rapid-1"
6. Or approved equal

F. Water-Reducing and Retarding Admixture:

1. ASTM C 494, Type D
 2. Acceptable Product: BASF "Masterset R 100"
 3. Acceptable Product: Euclid Chemical Company "EUCON RETARDER 75" or "EUCON DS"
 4. Acceptable Product: W. R. Grace "Daratard 17" or "Recovery Series"
 5. Acceptable Product: Sika Corporation "Plastiment Series"
 6. Or approved equal
- G. Water-Reducing and Accelerating Admixture:
1. ASTM C 494, Type E
 2. Acceptable Product: BASF "Masterset FP 20"
 3. Acceptable Product: Euclid Chemical Company "ACCELGUARD 80" or "ACCELGUARD 90"
 4. Acceptable Product: W. R. Grace "Libricon NCA"
 5. Acceptable Product: Sika Corporation "Sikaset NC" or "Plastocrete 161 FL"
 6. Or approved equal
- H. Mid-Range Water-Reducing Admixture:
1. ASTM C 494, Type A
 2. Acceptable Product: BASF "MasterPolyheed Series"
 3. Acceptable Product: W. R. Grace "Daracem" or "Mira"
 4. Acceptable Product: Sika Corporation "Sikaplast Series" or "Sikament Series"
 5. Acceptable Product: Euclid Chemical Company: "Eucon MR" or "Eucon MRX"
 6. Or approved equal
- I. High-Range Water-Reducing Admixture:
1. ASTM C 494, Type F
 2. Acceptable Product: BASF "PS 1466" or "MasterGlenium Series"
 3. Acceptable Product: Euclid Chemical Company "EUCON 37" or "PLASTOL SERIES"
 4. Acceptable Product: W. R. Grace "Daracem" or "ADVA" Series
 5. Acceptable Product: Sika Corporation "Viscocrete Series" or "Sikament Series"
 6. Or approved equal
- J. High-Range Water-Reducing and Retarding Admixture:
1. ASTM C 494, Type G
 2. Acceptable Product: Euclid Chemical Company "EUCON 537"
 3. Acceptable Product: W. R. Grace "Daracem Series" or "Adva Series"
 4. Or approved equal
- K. Viscosity Modifying Admixture (VMA) for Self-Consolidating Concrete (SCC):
1. Acceptable Product: BASF "MasterMatrix VMA Series"
 2. Acceptable Product: W.R. Grace "V-MAR3"
 3. Acceptable Product: Euclid Chemical Company "EUCON ABS" or "EUCON WO" or "Visctrol"
 4. Acceptable Product: Sika Corporation "Sika Stabilizer Series"
 5. Or approved equal
- L. Corrosion Inhibiting Admixtures:
1. Calcium Nitrite Based: ASTM C 494, Type C, 30% + 2% solution
 - a) Acceptable Product: W.R. Grace "DCI or DCI-S"
 - b) Acceptable Product: Euclid Chemical Company "EUCON CIA"
 - c) Acceptable Product: Sika Corporation "Sika CNI"
 - d) Or approved equal
 2. Amine Carboxylate Based: ASTM C 1582, which includes ASTM C-494 amine carboxylate
 - a) Acceptable Product: Cortec Corporation "MCI 2005", "MCI 2005 NS", "MCI 2006" or "MCI 2006 NS" or approved equal.
 3. Amino Alcohol Based:
 - a) Acceptable Product: Sika Corporation "Sika FerroGard 901" or approved equal.
- M. Shrinkage Reducing Admixtures:

1. ASTM C 157
 2. Acceptable Product: W.R. Grace "Eclipse 4500" (for use with air-entrained concrete exposed to freeze/thaw), or "Eclipse Floor 200"
 3. Acceptable Product: Euclid Chemical Company "EUCON SRA" or "Conex"
 4. Or approved equal.
- N. Waterproofing Admixture:
1. Water-Based Hydrophobic Pore Blocking Concrete Admixture
 2. Admixture to meet guidelines for permeability reducing admixtures suitable for hydrostatic (PRAH) and non-hydrostatic (PRAN) service conditions per ACI 212 chapter 15 "Report on Chemical Admixtures".
 3. Admixture to meet 50% or greater reduction in sorptivity compared to control at seven days according to ASTM C1585.
 4. Admixture to demonstrate sulfate expansion resistance in concrete with 0.45 water/cement of less than 0.05% expansion at 18 months per ASTM C1012.
 5. Admixture to demonstrate 55% or greater reduction in water sorptivity compared to control per ASTM C1757.
 6. Acceptable Product: Hycrete W1000, as manufactured by Hycrete, Inc., 462 Barell Avenue, Carlstadt, New Jersey
Acceptable Product: Krystol Internal Membrane (KIM) manufactured by Kryton
 7. Or approved equal

2.04 FIBER REINFORCEMENT

- A. General:
1. Fiber reinforcement specified below can be used only with the Commissioner's prior written approval.
 2. See Drawings for location of Fibers.
 3. Where macro synthetic fiber reinforcement is proposed to replace welded wire reinforcement, Contractor shall demonstrate that proposed material and dosage rate provides equivalent performance to welded wire reinforcement indicated on Drawings.
 4. Fiber reinforcement shall not replace reinforcing bars shown on Drawings.
- B. Synthetic Fibrillated or Monofilament Micro Fibers (low volume synthetic used for reduction of plastic shrinkage)
1. ASTM C 1116, Type III
 2. Acceptable Product: W.R. Grace "Grace Fibers", "Grace Microfibers"
 3. Acceptable Product: Euclid Chemical Company "Fiberstrand 100 or Fiberstrand 150"
 4. Acceptable Product: Sika Corporation "Sika Fiber PPM" or "Sika Fiber PPF" or Sika Fiber HP"
 5. Or approved equal
- C. Macro Synthetic Fibers (high volume synthetics used for reduction of plastic and drying shrinkage cracking)
1. ASTM C 1116, Type III, minimum of 1.55 inches (40 mm) length, aspect ratio of 50 to 90. The fiber shall have a minimum average residual strength (ARS) of 200 psi (1.4MPa) measured as per ASTM C 1399/ASTM C 1609 "Test Method for Obtaining Average Residual Strength of Fiber-Reinforced Concrete".
 2. Acceptable Product: W.R. Grace "Strux 90/40"
 3. Acceptable Product: Euclid Chemical Company "Tuf-Strand SF"
 4. Acceptable Product: Sika Corporation "Sika Fiber MS 20"
 5. Or approved equal
- D. Carbon Steel Fibers (smooth or deformed)
1. ASTM C1116, Type 1 and A820
 2. Acceptable Product: Bakaert Corporation's "Dramix 65/60"
 3. Acceptable Product: Fiber con International, Inc's "Fibercon"

4. Acceptable Product: Sika Corporation "Sika Fiber S or Sika Fiber SH Series"
5. Or approved equal

2.05 ADHESIVES

- A. Bonding Agent for Cured Concrete (existing concrete damp or dry, at least 28 days old, no surface water):
1. ASTM C 881 Type I and IV, Grade 3, Class B and C.
 2. Acceptable Product: BASF "CONCRETE PASTE (LPL)", Class C Only
 3. Acceptable Product: BASF "CONCRETE LIQUID (LPL)", Class C Only for bonding topping
 4. Acceptable Product: Euclid Chemical Company "EUCO #452 Epoxy System"
 5. Acceptable Product: Euclid Chemical Company "DURALCRETE LV Series"
 6. Acceptable Product: Euclid Chemical Company "FLEXOCRETE System" for bonding topping
 7. Or approved equal
- B. Bonding Agent for Uncured Concrete: (existing concrete damp or dry, less than 28 days old, no surface water):
1. ASTM C 881, Type II and V, Grade 2, Class B and C.
 2. Acceptable Product: Euclid Chemical Company "DURALCRETE MV System"
 3. Acceptable Product: Sika Corporation "Sikadur 32 Hi-Mod"
 4. Or approved equal
- C. Anti-Corrosive Epoxy Cementitious Bonding Compound and Corrosion Protection of Reinforcement (bonding agent for existing concrete saturated surface dry, no surface water):
- This adhesive shall be a water-based epoxy/cementitious compound for adhesion and corrosion protection of reinforcing members (20 hour maximum open time).
1. Acceptable Products: Euclid Chemical Company "DURALPREP AC"
 2. Acceptable Products: Sika Corporation "ARMATEC 110"
 3. Or approved equal
- D. Adhesive Between Cured Concrete Elements:
1. ASTM C 881 Type I and IV, Grade 3, Class B and C
 2. Acceptable Product Sika Corporation "Sikadur 31 Hi-Mod Gel [1:1 Mix Ratio]"
 3. Or approved equal

2.06 CURING COMPOUNDS AND SEALERS

- A. Interaction with finishes:
1. See architectural Drawings for finish material applied over concrete.
 2. Use only curing and sealer compounds that are compatible with finish material.
 3. Manufacturer's certification is required.
 4. Where finish material is liquid rubberized asphalt, use only strippable type curing compound.
 5. All concrete curing compounds, sealers, and sealants shall meet, at a minimum, all federal and state requirements for volatile organic compounds (VOC's). Per NYC EPP Minimum Standards for Construction Projects, the maximum concentration of VOC shall not exceed 350 grams per liter.
- B. Curing and Sealing Compound (VOC Compliant, 350 g/l) :
1. ASTM C1315, Type I, Class A and ASTM C 309, Type 1, Class A or B
 2. Water based acrylic, clear, 25% solids curing and sealing compound.
 3. Acceptable Product: Euclid Chemical Company "Super Diamond Clear VOX"
 4. Acceptable Product: Dayton Superior "Cure & Seal J22WB"
 5. Acceptable Product: BASF (Sonneborn) "Kure 1315"
 6. Acceptable Product: W.R. Meadows "VOCOMP-25"
 7. Or approved equal

- C. Curing Compound-Dissipating/Strippable (VOC Compliant, 350 g/l):
1. ASTM C 309, Type I, Class A or B
 2. Water based resin, clear curing compound that begins to dissipate when exposed to UV light and traffic.
 3. Acceptable Product: Euclid Chemical Company "Kurez DR VOX" (Dissipating) or "Kurez RC" in combination with "Kurez RC-Off" (Strippable)
 4. Acceptable Product: Dayton Superior "Clear Resin Cure J11W"
 5. Acceptable Product: W.R. Meadows: "1100 Clear"
 6. Or approved equal

2.07 SEALERS

- A. Surface Sealer:
1. ASTM C 309, Type I, Class A or B
 2. Water based acrylic sealing compound.
 3. Acceptable Product: Euclid Chemical Company "DIAMOND CLEAR VOX"
 4. Acceptable Product: Dayton Superior "Cure & Seal 309 EF"
 5. Acceptable Product: BASF "MasterKure CC 200WB"
 6. Acceptable Product: "W.R. Meadows "VOCOMP 20"
 7. Or approved equal
- B. Liquid Densifier/Sealer:
1. The liquid densifier compound shall be a silicate based compound that penetrates and chemically hardens concrete surfaces.
 2. Acceptable Product: Euclid Chemical Company "Euco Diamond Hard"
 3. Acceptable Product: Dayton Superior "Densifier J13"
 4. Acceptable Product: BASF "MasterKure HD 200WB"
 5. Acceptable Product: W.R. Meadows "Liqui-Hard"
 6. Or approved equal

2.08 DRY SHAKE HARDENERS

- A. Mineral Aggregate Hardener:
1. The specified mineral aggregate hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specially processed graded mineral aggregate, selected Portland cement and necessary plasticizing agents
 2. Acceptable Product: Euclid Chemical Company, "Surflex" to be used with "Kurez DR VOX"
 3. Acceptable Product: BASF, "MasterTop 100 to be used with "Masterkure CC 200WB"
 4. Acceptable Product: L&M Construction Chemicals "Ferrocon FF" to be used with "Dress & Seal WB 30"
 5. Or approved equal
- B. Non-Oxidizing Metallic Hardener:
1. The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected Portland Cement and necessary plasticizing agents.
 2. Acceptable Product: Euclid Chemical Company, "Diamond-Plate" to be used with "Kurez DR VOX"
 3. Acceptable Product: BASF "MasterTop 210COR" to be used with "MasterKure CC 200WB"
 4. Or approved equal

2.09 MISCELLANEOUS CONCRETE PRODUCTS

- A. Nonshrink Grout
1. Provide pre-packaged natural aggregate grout, high-precision, nonshrink, ready-to-use, complying with the following requirements:
 - a) See General Notes for grout minimum compressive strength.
 - b) Grout shall conform to ASTM C 1107
 2. All material used including water, mixer and pre-packaged grout must be initially at the 45°F (7°C) and 90°F (32°C) limits when testing is initiated.
 3. Acceptable Product: BASF "MASTERFLOW 928"
 4. Acceptable Product: Euclid Chemical Company "HI-FLOW GROUT"
 5. Acceptable Product: Five Star Products "Five Star Grout"
 6. Acceptable Product: Sika Corporation "Sikagrout 328"
 7. Or approved equal
- B. Self-Leveling Concrete Topping - Underlayment for Interior Applications:
1. Use self-leveling underlayment concrete formulated to level concrete floors without shrinking, cracking or spalling, and capable of being placed from feathered edge to 1" (25mm) thickness without aggregate in one pour. If greater than 1" (25mm) thickness is required, aggregate shall be used in accordance with manufacturer's requirements. Appropriate primer shall be utilized for all underlayment applications.
 2. Acceptable Product: Ardex Engineered Cements "ARDEX K-15"
 3. Acceptable Product: Euclid Chemical Company "Flo-Top or Super Flo-Top"
 4. Acceptable Product: Sika Corporation "Sika Level Series"
 5. Or approved equal

2.10 MISCELLANEOUS PRODUCTS

- A. Evaporation Retarder:
1. Evaporation retarders shall meet, at a minimum, all federal and state requirements for volatile organic compounds (VOC's). Per NYC EPP Minimum Standards for Construction Projects, the maximum concentration of VOC shall not exceed 350 grams per liter.
 2. Acceptable Product: BASF "Masterkure ER50"
 3. Acceptable Product: Euclid Chemical Company "Eucobar"
 4. Acceptable Product: Sika Corporation "Sika Film"
 5. Or approved equal
- B. Moisture-Retaining Covers:
- Conforming to ASTM C171. A naturally colored, non-woven polypropylene fabric with a 4-mil non-perforated reflective (white) polyethylene coating containing stabilizers to resist degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture retention.
1. Hydracure S-16 by PNA Construction Technologies, Inc., Matthews, NC
 2. Transguard 4000 by Reef Industries (Armorton Division), Incorporated, Houston TX
 3. Or approved equal
- C. Sand Cushion: Clean, manufactured or natural sand.
- D. Expanded Polystyrene (EPS) used as Fill - Geofoam
1. Material: Rigid, closed cell polystyrene blocks formed by expansion of polystyrene beads by steam.
 2. Comply with the requirements of ASTM D 6817
 3. Unless noted otherwise on the drawings, provide the following types of EPS:
 - a) Fill between a lower slab and a raised slab area: EPS12 -2.2 psi (15 kPa) compressive resistance minimum at 1% deformation, 10 psi (70 kPa) flexural strength minimum

- b) Typical below interior floor slabs supported on grade (soil fill over EPS fill) or directly on EPS fill: EPS15 - 3.6 psi (25 kPa) compressive resistance minimum at 1% deformation, 25 psi (170 kPa) flexural strength minimum
- c) Fill below exterior floor slabs or slabs with truck loading: EPS19 - 5.8 psi (40 kPa) compressive resistance minimum at 1% deformation, 30 psi (200 kPa) flexural strength minimum
- 4. Thickness as indicated on Drawings.
- 5. Execution: Conform to manufacturer's instructions regarding preparation, installation and protection
- 6. Gripper plates shall be used as needed to restrain EPS from moving laterally in multi-layer applications
- 7. Contractor shall sequence soil or concrete topping placement to avoid EPS block shift or flotation.
- 8. Submit the following for review:
 - a) Manufacturer's product literature including physical properties in compliance with ASTM D 6817 and type specified
 - b) 10 year physical property warranty
 - c) Proposed plan layout of fill blocks showing gaps between blocks where required for stabilizing and/or load bearing reinforced concrete ribs as shown on drawings, in details or in notes.
- 9. Submit the following for record:
 - a) Summary of test compliance with specified performance characteristics and physical properties
 - b) Product Certificates showing evidence of third party quality control
- 10. Acceptable product: Foam Control EPS Geofoam by AFM Corporation, Lakeville, MN
- 11. Acceptable product: EPS Geofoam by Styrotech, Brooklyn Park, MN
- 12. Acceptable product: EPS Geofoam by Universal Foam Products, Hunt Valley, MD
- 13. Acceptable product: EPS Geofoam by Dyplast Products, Miami, FL
- 14. Or approved equal
- E. Vapor Retarder: See Division 7, Thermal and Moisture Protection
 - 1. Minimum 15-mil thick polyolefin geomembrane
 - 2. Manufactured with prime virgin resins
 - 3. Water Vapor Retarder: ASTM E 1745, meets or exceeds Class A
 - 4. Water Vapor Transmission Rate: ASTM E 96, 0.008 gr./ft²/hr. (0.086 gr./m²/hr) or lower
 - 5. Permeance Rating: ASTM E 96, 0.03 perms or lower for new material and after conditioning tests in accordance with applicable sections of ASTM E 154
 - 6. Puncture Resistance: ASTM E 1745, minimum 2400 grams
 - 7. Tensile Strength: ASTM E 1745, minimum 45.0 lbs./in (8.0 kg/cm).
 - 8. Acceptable product: W.R.Grace, "Florprufe 120"
 - 9. Acceptable product: W. R. Meadows, "Perminator"
 - 10. Acceptable product: Stego Industry LLC, "Stego Wrap"
 - 11. Acceptable product: Raven Industries, "Raven Vapor Block 15".
 - 12. Or approved equal
- F. Non-Slip Aggregate:
 - 1. Abrasive aggregate shall be composed of an aluminum oxide abrasive bonded by a vitreous ceramic material. Use hard, homogeneous, non-glazing, rustproof aggregate which is unaffected by moisture or cleaning compounds.
 - 2. Acceptable Product: Euclid Chemical Company "NON-SLIP AGGREGATE"
 - 3. Acceptable Product: North Company "Alundum"
 - 4. Acceptable Product: Anti-Hydro International "A-H A-2 Emery Shake-On" or "A-H Alox"
 - 5. Or approved equal

2.11 CONCRETE REPAIR MATERIALS

- A. Polymer Repair Mortar
1. The following patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Commissioner is required.
 2. Acceptable Products (Horizontal Repairs): Euclid Chemical Company "Thin Top Supreme or Tammspatch II" (for 1/16" (2mm) to 3/8" (10mm) thickness), or "Concrete Top Supreme" (for 3/8" (10mm) to 2" (50mm) thickness).
 3. Acceptable Products (Horizontal Repairs): Sika Corporation "Sikatop 121 Plus" or "Sikatop 122 Plus".
 4. Acceptable Products (Vertical and Overhead Repairs): Euclid Chemical Company "Verticoat", "Verticoat Supreme", or "Duraltop Gel".
 5. Acceptable Products (Vertical and Overhead Repairs): Sika Corporation, "Sikatop 123 Plus".
 6. Acceptable Products (Horizontal, Vertical and Overhead Repairs): BASF, "EMACO 100"
 7. Or approved equal
- B. High Strength Flowing Repair Mortar
1. For forming and pouring structural members, or large horizontal repairs, provide the flowable one-part, high strength microsilica modified repair mortar with 3/8" (10mm) aggregate.
 2. The product shall achieve 9000 psi (62MPa) @ 28-days at a 9-inch (225mm) slump.
 3. Prior approval by the Commissioner is required for cold weather applications
 4. Acceptable Product: Euclid Chemical Company "Eucocrete"
 5. Acceptable Product: BASF "EMACO S" Series
 6. Acceptable Product: Sika Corporation "Sika Repair 211 SCC Plus"
 7. Or approved equal
- C. Repair Topping
1. Latex and microsilica modified cementitious mortar topping, which meets or exceeds the bond strength requirements of ASTM C 1059.
 2. Resistance to wear: The finished topping shall show a depth of wear of 0.2 mm (0.0079") or less when tested at 28 days with a Chaplin Abrasion Tester.
 3. Acceptable Products: Euclid Chemical Company, "Thin-Top Supreme or Tammspatch II"
 4. Acceptable Product: Sika Corporation "Sika Repair 211 SC Plus"
 5. Or approved equal
- D. Epoxy Injection:
1. ASTM C881, moisture insensitive maximum viscosity 350 cps at 77°F (25°C).
 2. Acceptable Product: BASF "Concresive 1380"
 3. Acceptable Product: Euclid Chemical Company "Eucopoxy Injection Resin"
 4. Acceptable Product: Sika Corporation "Sikadur 35, LV, LPL"
 5. Or approved equal
- E. Pressure-Injected Foam Resin:
1. Acceptable Product: DeNeef "HA Sealform"
 2. Acceptable Product: 3M "ScotchSeal 5600"
 3. Acceptable Product: Sika Corporation "SikaFix HH"
 4. Or approved equal
- F. Semi Rigid Epoxy:
1. Acceptable Product: METZGER/McGUIRE "MM-80 Semi Rigid Epoxy Joint Filler" or approved equal.
- G. Methyl Methacrylate (MMA)
1. Acceptable Product: Transpo Industries, Inc. "T-78 Methyl Methacrylate Polymer Crack Healer/Sealer" or approved equal.
- H. Sealant:

1. Silicone or Polyurethane Sealant (as selected based on project requirements such as loading, traffic, bond, coatings, etc.).
2. Joint to be routed and cleaned per manufacturer's written directions.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Subgrade:
 1. Dampen subgrades not covered with membrane by sprinkling immediately before placing concrete.
 - a) Omit when subgrade is already damp.
 2. Do not place on water-saturated subgrade unless placing can be done without damage to subgrade (surface is stable) and loading the subgrade does not drive free water to the surface.
 3. Do not place concrete on frozen ground.
- B. Forms:
 1. Coordinate with Section 031000 Concrete Formwork.
 2. Remove dirt, sawdust, nails and other foreign material from formed space.
 3. Dampen wood forms by sprinkling immediately before placing.
 4. Cool metal forms by sprinkling immediately before placing.
- C. Concrete Accessories:
 1. Coordinate with Section 031000 Concrete Formwork.
- D. Dewatering:
 1. Remove water from concrete formwork.
 2. Divert any flowing water to sump and remove by pumping.
 3. Refer to DDC General Conditions for additional dewatering requirements.
- E. Vapor Retarder Placement: See Division 7, Thermal and Moisture Protection.
 1. Vapor retarder installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
 2. Place vapor retarder under slabs-on-grade in position with longest dimension parallel with direction of pour.
 3. Joints: Lap 6" (150mm) minimum and seal with manufacturer's recommended mastic or pressure-sensitive tape.
 4. Prevent damage to moisture barrier.
 5. If moisture barrier is damaged, place a piece of moisture barrier over damaged area (6" (150mm) larger all around) and tape in place with type of tape recommended by moisture barrier manufacturer.
 6. Seal laps and intersections of walls with compatible trowel mastic or pressure-sensitive sealing tape.
 7. Seal around pipes and other penetrations with compatible trowel mastic.
 8. The vapor barrier must be approved prior to concrete placement.

3.02 JOINTS IN CONCRETE

- A. Locate construction and contraction joints as indicated on Drawings and on approved joint location submittal.
 1. Do not use contraction joints in framed floors or composite slabs.
 2. Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to The Commissioner.

3. Coordinate location of construction and contraction joints with locations of joints in finish materials where they exist.
 - a) Construction and contraction joints in slabs or slab on grade with terrazzo finish must be reviewed and approved by the Commissioner.
 4. Maximum joint spacing is as indicated on Drawings.
- B. Construction Joints:
1. Construction joints shall be located within the central third of the span. Any concrete spilling over or through the bulkhead shall be removed at the completion of the pour. All surfaces of the concrete shall have reinforcing extending through the joint.
 2. Horizontal Joints: Horizontal construction joints other than those shown on the Drawings will not be permitted unless approved by the Commissioner.
 3. Joint Preparation: Forms shall be removed in time to permit roughening of construction joints of structural members by chipping and wire brushing to remove all loose and foreign material and roughen to $\frac{1}{4}$ " amplitude. The existing concrete at joints shall either be (a) dampened to the point that the surface is saturated, but all standing water has been removed, promptly followed by placement and vibration of fresh concrete, or (b) not required to be dampened, with one of the specified bonding compounds applied as appropriate for the joint condition, following manufacturer recommendations, with placement and vibration of fresh concrete to follow while the epoxy bonding agent is still tacky. Joints without epoxy bonding agent require fresh concrete with slump 7 inches (180mm) or greater at horizontal joints, and fresh concrete confined to maintain pressure against the joint at vertical joints. Where such conditions are not present, or where applying water to dampen the surface is impractical, use epoxy bonding agent suitable for dry surfaces
- C. Isolation Joints:
1. Interrupt structural continuity resulting from bond, reinforcement or keyway at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls and other locations, as indicated.
- D. Contraction Joints in Floor Slabs-on-Grade:
1. Maximum slab area controlled by jointing is 400 square feet (35 square meters).
 2. Space joints at 36 times slab thickness unless a smaller spacing is indicated on the Drawings, located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
 3. Contraction joints can be provided by sawcuts, formed joints or appropriately detailed construction joints.
 4. Sawcuts shall be made as soon as possible after slab finishing as may be safely done without dislodging aggregate. The saw shall be used to a depth of $\frac{1}{4}$ of slab thickness immediately after final finishing. Conventional saw shall be used as soon as possible after final finish without raveling to a depth as indicated on the Drawings.
 5. Where contraction joints coincide with construction joints, detail joint as indicated on Drawings.
- E. Joint Fillers: Coordinate with Section 032000 Concrete Reinforcement and Embedded Assemblies and Division 7 requirements.

3.03 MIXING

- A. Measurement of Materials: Conforming to ASTM C 94
- B. Mixing: All concrete shall be ready-mixed conforming to ASTM C 94 except as follows:
1. Provide concrete materials, proportions and properties as herein specified in lieu of ASTM C 94.
 2. Water, beyond that required by the mix design, shall not be added at the Project site. Addition of water at the Project site shall be made only in the presence of the Testing Agency.
 3. Furnish delivery ticket with each load of concrete delivered to the site to the Contractor conforming to the requirements of ASTM C 94.

- C. High range water reducing agents (superplasticizer), if added at the batch plant, may be added again at the Project site.
 - 1. If superplasticizers are added at the batch plant, the concrete mix design must account for the delivery time, workability, finishability, and setting time required on the jobsite for proper placing and finishing procedures.
 - 2. If the superplasticizer is redosed at the jobsite in air entrained concrete, air content must be checked after mixing.
- D. Discharge of the concrete shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates.

3.04 CONCRETE PLACEMENT

- A. Prior to Concrete Placement:
 - 1. Mechanical vibrators are required and must be available for placing concrete.
 - 2. Remove debris from space to be occupied with concrete.
 - 3. Notify Commissioner and Testing Agency 48 hours prior to starting concrete placement.
 - 4. Approved mix designs must be maintained on file in Contractor's Field Office.
 - 5. Reinforcement and accessories shall be in proper locations, clean, free of loose scale, dirt or other foreign coatings that may reduce bond to concrete, and in accordance with Section 032000 and Drawings.
 - 6. Fog spray forms, reinforcing steel, and subgrade just before pouring concrete.
 - 7. Do not place concrete having a slump outside of allowable slump range.
 - 8. Place concrete before initial set has occurred, but in no event after it has been discharged from the mixer more than 30 minutes. All concrete shall be placed upon clean, damp surfaces, free from puddled water, or upon properly consolidated fills. Placement upon soft mud or dry earth is not permitted.
 - 9. Unless adequate protection is provided, concrete shall not be placed during rain.
 - 10. Rain water shall not be allowed to increase mixing water or to damage the surface finish.
 - 11. At surfaces left exposed to view, do not use equipment in placing and finishing concrete that contain aluminum in the finishing edges that come in contact with the concrete surface.
 - 12. Keep subgrade moisture uniform without puddles or dry areas.
 - 13. Place vapor retarder directly below slabs on grade as specified in Contract Documents.
- B. For Conduits and Pipes Embedded in Concrete:
 - 1. For concrete slab, wall, beam or column, conform to requirements of ACI 318, Chapter 6. For variations from these requirements, submit a written request for Commissioner' review and response.
 - 2. Conduits and pipes shall not be embedded in concrete slabs on steel deck without approval of the Commissioner.
 - 3. Provide sleeves for pipes passing vertically through concrete.
 - 4. Do not embed aluminum materials.
 - 5. Do not cut, bend or displace the reinforcement to facilitate placement of embedded pipes and conduits.
- C. Pumping: Pumping shall be done in strict accordance with ACI 304.2R.
- D. Placing Concrete in Forms:
 - 1. Clean and prepare forms as specified in Section 031000/Concrete Formwork.
 - 2. Place concrete continuously without interruption between predetermined construction and contraction joints in walls.
 - 3. Deposit concrete in forms in horizontal layers no deeper than 24" (600mm) and in a manner to avoid inclined construction joints.
 - 4. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

5. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping.
 - a) Use equipment and procedures for consolidation of concrete in accordance with ACI 309R.
 6. Do not use vibrators to move fresh concrete laterally inside forms from discharge point; shift discharge point as needed.
 7. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine.
 8. Place vibrators to rapidly penetrate placed layer and at least 6" (150mm) into preceding layer.
 9. Do not insert vibrators into lower layers of concrete that have begun to set.
 10. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
 11. Do not vibrate Self-Consolidating Concrete (SCC).
- E. Placing Concrete Slabs:
1. Place concrete continuously without interruption between predetermined construction and contraction joints in floors.
 - a) Place slabs on grade by the long strip cast method. Refer to ACI 302.1R for recommended methods of placement.
 2. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 3. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 4. Bring slab surfaces to correct level with a straightedge and strike off.
 - a) Use highway straight edges, bullfloats or darbies to smooth surface free of humps or hollows.
 - b) Do not disturb slab surfaces prior to beginning finishing operations.
 5. Maintain reinforcing in proper position on chairs during concrete placement.
 6. Do not place materials on slabs or impose loads during period of setting.
- F. Placing Concrete on Steel Decks
1. Exercise care during concrete placement on steel decks to prevent concentrated loads or high pile-ups of concrete and to avoid impacts caused by dumping or dropping of concrete on steel decks.
 2. Do not use buggies on unprotected areas of deck. If buggies are used to place concrete, furnish and install planked runways to protect deck from damage.
- G. Placing Concrete at Construction Joints:
1. To secure full bond at construction joints, surfaces to receive concrete in a subsequent placement shall be left in a roughened state or intentionally roughened by raking while plastic or brushing and chipping immediately after removal.
 2. Before new concrete is placed in contact, surfaces of hardened concrete already placed shall be thoroughly cleaned of foreign materials and laitance.
 3. At hardened concrete at joints where no bonding agents are used, dampen concrete to achieve a saturated surface dry condition. Leave no standing water. Place and vibrate concrete (slump 7 inches (180mm) or greater) against horizontal joints. Place and vibrate flowing concrete (slump 8 to 10 inches (200 to 250mm)) while maintaining pressure against vertical joints by confinement.
 4. At hardened concrete with joints not meeting conditions required for no bonding agents, apply appropriate specified bonding agent for conditions present including age and moisture per manufacturer's specifications. Place new concrete while the bonding agent is still tacky.
- H. Floor Topping Slabs:
1. Place concrete topping slab to required lines and levels.
 2. Minimum topping slab thickness is 2" (50mm).

3. Place dividers, edge strips and other items to be cast in place.
4. At all topping slabs, remove deleterious material before placing topping slab.
5. At topping slabs placed directly against base slab, remove deleterious material and dampen base slab with water immediately before placing concrete. Leave no standing water.
6. Unless noted as a "bonded" topping slab on the Drawings, topping slabs thinner than 4" (100mm) should be placed directly against dampened base slab with no bonding agent. Topping slabs 4" (100mm) or thicker should be placed on bond breaker consisting of two sheets of plastic film.
7. Where noted on Drawings as a "bonded" topping slab, broom/vacuum clean unsealed surfaces or wire brush sealed or troweled surfaces to expose bare rough surface. Then place approved bonding grout or epoxy adhesive on the base slab per manufacturer's instructions.
8. The topping mix shall have a maximum water/cement ratio of 0.45.
9. The topping mix shall have a maximum shrinkage of 0.04% in 28 days.
10. The topping mix shall contain a minimum of 5 lbs. per cubic yard (2.43 kg/m³) of macro synthetic fibers and achieve an Average Residual Strength (ARS) of 200 psi (1.4MPa) unless a higher dosage or ARS is noted on the plans.
11. The topping slab shall be moist cured for a minimum of 36 hours after placement.
12. The topping slab shall have contraction joints located to match any joints in the base slab, to eliminate restraint conditions such as re-entrant corners and to isolate the slab from columns, walls, etc. and to limit the maximum distance between joints to 15 feet (4570mm).

I. Cold-Weather Placement:

1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306R and as specified in this section.
2. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C), at point of placement.
3. Do not use frozen materials or materials containing ice or snow.
 - a) Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Remove frost, snow and ice from forms, reinforcement and other embedments immediately prior to concrete placement.
5. Use only the specified non-corrosive accelerating admixture previously approved as part of the cold weather mixture. Addition of calcium chloride, salt, thiocyanates or admixtures containing more than 0.05 percent chloride ions is not permitted.

J. Hot-Weather Placement:

1. Hot weather is defined as air temperature which exceeds 90°F (32°C) or any combination of high temperature, low humidity and/or high wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square feet per hour (1.0 kg/m² per hour) as determined by ACI 305R.
2. When hot weather conditions exist that would impair quality and strength of concrete, place concrete in compliance with ACI 305R and as specified in this section.
3. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C).
4. Mixing water may be chilled, or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
5. Use of liquid nitrogen to cool concrete is Contractor's option.
6. When concrete placement will occur late in the day and reinforcing steel will be heated by the sun, cover reinforcing steel with water-soaked burlap so that steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
7. When concrete operations must be performed in direct sun, wind, high temperatures, low relative humidity, or other adverse placing conditions, the specified evaporation retarder shall be applied one or more times during the finishing operation to prevent plastic cracking.

3.05 CONCRETE FINISHES

- A. General:
1. Comply with recommendations for concrete finishing established by ACI 302.1R and ACI 304R.
 2. Comply with dimensional tolerance limitations given by ACI 117.
 3. For shored floor or slab on grade construction: Floor flatness/floor levelness tolerance compliance testing is to be performed prior to the removal of shores and forms but not later than 72 hours of concrete placement by Testing Agency.
 4. See architectural Drawings for locations of the various finishes listed below.
 5. Comply with the specified overall SOF_F and SOF_L values listed below:
 - a) The specified overall area shall be each individual floor.
 - b) F_F/F_L shall be measured in accordance with ASTM E 1155.
 - c) The specified minimum local values of MLF_F/MLF_L shall be 3/5 of the SOF_F/SOF_L values listed below.
 - d) If an individual test section measures less than either of the specified minimum local MLF_F/MLF_L numbers, that section may be rejected and remedial measures may be required as specified in CONCRETE SURFACE REPAIRS.
 - e) If the composite value of the test surface measures less than either of the specified overall SOF_F/SOF_L numbers, then the entire slab may be rejected and remedial measures may be required.
 - f) F_L numbers shall not apply to unshored slabs or shored slabs with camber.
- B. Finish for monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile and other bonded applied cementitious finish flooring material, as indicated on architectural Drawings:
1. Scratch Finish.
 - a) Finish surface to overall value of $SOF_F=20$ and $SOF_L=15$.
 - b) Slope surfaces uniformly to drains where required.
 - c) After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- C. Finish for monolithic slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, sand-bed terrazzo as indicated on architectural Drawings:
1. Float Finish.
 - a) After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
 - b) Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.
 - c) Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units.
 - d) Finish surfaces to overall value of $SOF_F=20$ and $SOF_L=15$.
 - e) Cut down high spots and fill low spots.
 - f) Uniformly slope surfaces to drains.
 - g) Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- D. Finishes for Pedestrian Sidewalks and Ramps, Exterior Platforms, Steps, as indicated on architectural Drawings:
1. Sidewalks and Curbs: Light-to-medium broom finish applied with fiber-bristle broom perpendicular to direction of main traffic route immediately after float finishing.
 2. Ramps: Scored finish as applied perpendicular to direction of main traffic route immediately after float finishing.
 3. Finish surface to overall value of $SOF_F=20$ and $SOF_L=15$.
 4. Texture shall be approved by the Commissioner from sample panels.
- E. Finish for interior floor slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile on thick-set mortar, paint or another thin film-finish coating system, as indicated on architectural Drawings:

1. Trowel Finish.
 - a) After floating, begin first trowel-finish operation using a power-driven trowel.
 - b) Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
 - c) The final hand-troweling operation shall result in a smooth surface, free of trowel marks, uniform in texture and appearance.
 - d) Grind smooth any surface defects that would telegraph through applied floor covering system.
 2. Finish surface to overall value of $SOF_F=25$ and $SOF_L=20$.
 3. Floor Slopes: Where drains occur, slope floor slabs uniformly to drains, maintaining scheduled slab thickness.
 4. Floor Edges at Expansion Joints: Tool edges minimum 3/8" (10mm).
 5. Defects: Remove defects of sufficient magnitude to show through floor covering by grinding.
 6. Floor Hardener: Use only where scheduled and in accordance with manufacturer's published instructions.
 7. Dry Cement: Shall not be used during finishing.
- F. Finish for thin set ceramic tile or thin set epoxy terrazzo, as indicated on architectural Drawings:
1. Trowel and Fine Broom Finish:
 - a) Apply a trowel finish as specified.
 - b) Immediately follow by slightly scarifying the surface with a fine broom.
 2. Finish surface to overall value of $SOF_F=35$ and $SOF_L=25$.
- G. Finishes for Parking Garage Deck, Ramps, Loading Docks:
1. Highway straight edge immediately after screeding concrete.
 2. Finish surface to overall values of $SOF_F=20$ and $SOF_L=15$.
 3. For Slabs Not Receiving Deck Coating: Medium broom finish with ridges not to exceed 1/8" (3mm) in height. Texture shall be as approved by the Commissioner from sample panels.
 4. For Slabs Scheduled to Receive Deck Coating: Smooth floated finish which must be verified with coating manufacturer before finishing the slab.
 - a) Coordinate with deck coating specified in Division 7.
 5. Auto Ramps: Rough texture applied perpendicular to direction of traffic. Texture shall be as approved by the Commissioner from sample panels.
- H. Tolerances at Slab Discontinuities
1. Within 2 ft (600mm) of slab boundaries, construction joints, isolation joints, block-outs, penetrations or other similar discontinuities, where required for travel paths, installation of finishes and partitions, or any other requirements indicated in the Contract Documents, the following equivalent straightedge tolerances shall apply:
 - a) Specified local $MLF_F = 12$, use 1/4" (6mm) over 4 ft (1200mm), no offset greater than 1/16" (2mm)
 - b) Specified local $MLF_F = 15$, use 1/8" (3mm) over 4 ft (1200mm), no offset greater than 1/32" (0.8mm)
- I. Dry Shake Finish:
1. Non-slip aggregate where indicated on Drawings.
 2. Non-oxidizing metallic hardener on loading docks at a rate of 1.5 lbs. per sq. ft. (7.3 kg/m²) and in other locations so noted on the Drawings.
 3. Mineral aggregate hardener at a rate of 1.2 lbs. per sq. ft. (5.8 kg/m²) where noted on the Drawings.
 4. Final finish type, method and tolerance as applicable by location and use.
 5. Dry shake finish will be applied only where scheduled and in accordance with the manufacturer's published instructions and the methods and procedures agreed upon at the pre-installation conference.
- J. Rough Formed Finish:

1. Acceptable for formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated.
 2. Concrete surface shall have texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4" (6mm) in height rubber down or chipped off.
- K. Smooth Formed Finish:
1. Required for formed concrete surfaces exposed to view, or scheduled to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system, as indicated on architectural Drawings:
 2. Surface is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 3. Repair and patch tie holes and defects. Remove fins and other projections completely.
- L. Smooth Rubbed Finish:
1. "Smooth Rubbed" finish shall consist of a finish free of fins, joint marks smoothed off, blemishes removed and surfaces left smooth and unmarred.
 2. Provide smooth rubbed finish to scheduled concrete surfaces, as indicated on architectural Drawings, which have received smooth form finish treatment not later than one day after form removal.
 3. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced.
 - a) Do not apply cement grout other than that created by the rubbing process.
- M. Grout-Cleaned Finish:
1. Provide grout-cleaned finish on scheduled concrete surfaces, as indicated on architectural Drawings, that have received smooth-formed finish treatment.
 2. Combine one part Portland Cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint.
 3. Blend standard Portland Cement and white Portland Cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
 4. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes.
 5. Remove excess grout by scraping and rubbing with clean burlap.
 6. Keep surface damp by fog spray for at least 36 hours after rubbing.
- N. Unformed Surfaces:
1. 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.
 2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.06 CURING AND PROTECTION

- A. Normal Conditions:
1. Protect concrete from premature drying, excessive hot or cold temperature, and damage.
 2. Concrete shall be kept continuously moist and above 50°F (10°C) for seven days (ASTM C 150 Type I cement) or for 10 days (ASTM C 150 Type II cement). High early strength concrete usage shall be maintained over 50°F (10°C) for three days.
 3. Concrete and concrete patching materials shall be cured according to manufacturers published recommendations.
 4. Begin curing as soon as free water has disappeared from concrete surface and finishing has been completed.
 5. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

- a) Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
 - i. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared).
 - ii. Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.
 - iii. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
 - iv. Maintain continuity of coating and repair damage during curing period.
 - v. Use curing and sealing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
 - vi. Floors to receive covering shall be cleaned thoroughly using a power scrubber and industrial strength detergent.
 - vii. Hand-brooming and sweeping is not sufficient.
 - viii. Strippable curing compound may be used in lieu of a moist curing method when approved by the Commissioner.
- b) Provide moist curing by the following methods:
 - i. Keep concrete surface continuously wet by covering with water.
 - ii. Use continuous water-fog spray.
 - iii. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4" (100mm) lap over adjacent absorptive covers.
- c) Provide moisture-retaining cover curing as follows:
 - i. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" (75mm) and sealed by waterproof tape or adhesive.
 - (1) Immediately repair any holes or tears during curing period using cover material and waterproof tape
- 6. Cure slabs on grade, concrete toppings, concrete pour strips, supported slabs, walls and columns, not subject to conditions of hot or cold weather concreting, in accordance with ACI 308.
- 7. Cure surfaces exposed to deicing salts, brackish water, etc., such as loading dock slabs, parking garage slabs and ramps in accordance with ACI 308 recommendations for moist curing.
- 8. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by leaving forms in place for the full curing period (equivalent to moist curing).
 - a) If forms are removed prior to completion of full curing period, continue curing by methods specified above for Unformed Surfaces, as applicable.
- B. Cold-Weather Protection:
 - 1. When concrete is placed under conditions of cold weather concreting (defined as a period when the mean daily temperature drops below 40°F (4°C) for more than 3 successive days), take additional precautions as specified in ACI 306R when placing, curing, monitoring and protecting the fresh concrete.
- C. Hot-Weather Protection:
 - 1. When concrete is placed under conditions of hot weather concreting, provide extra protection of the concrete against excessive placement temperatures and excessive drying throughout the placing and curing operations with an evaporation retarder.
 - a) Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
 - 2. Hot weather curing is required if hot weather conditions occur within a 24-hour period after completion of concrete placement.

- D. Floor surfaces, wherever indicated by weather conditions, shall be sprinkled during the interval between finishing operation and the start of curing to positively ensure against the possibility of surface drying.

3.07 CONCRETE REPAIRS

- A. Perform patching and repairs in accordance with ACI 301.
- B. Contractor shall submit patching and repair methods and materials for review by Commissioner.
- C. When complete, all patches and repairs shall match color and texture of adjoining surfaces.
- D. At surfaces that are exposed to view, prepare test areas at inconspicuous locations for review by Commissioner to verify repair color and texture match before proceeding with repair.
- E. Apply all patching and repair materials in accordance with manufacturer's specifications.
- F. Repairing Cracks In Formed and Unformed Surfaces:
 - 1. Contractor shall notify Commissioner of all cracks wider than 0.02" (0.50mm) and all cracks wider than 0.01" (0.25mm) that occur in a group of at least three cracks within twelve inches (300mm), in concrete. If Commissioner deem repairs necessary, Contractor shall be responsible for repairing all such cracks per Commissioner recommendation at no expense to the City of New York. Repairs will generally require one or more of the following: Epoxy Injection, Semi-Rigid Epoxy, Pressure Injected Foam Resin, Methyl Methacrylate and/or Sealant with joint routed and cleaned. See Concrete Repair Materials section of this Specification for acceptable products
- G. Repairing Formed Surfaces
 - 1. Immediately after stripping forms, patch all honeycombing, defective joints, voids, etc. before the concrete is thoroughly dry.
 - 2. Remove all burrs, fins, and ridges before the concrete is thoroughly dry.
 - 3. Remove stains from rust, grease and oils, from release agents, etc.
 - 4. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Commissioner.
 - a) Surface defects, include color and texture irregularities, cracks as defined above, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - b) Chip away defective areas, honeycomb, rock pockets, voids over 1/4" (6mm) in any dimension and holes left by tie rods and bolts, down to solid concrete but in no case to a depth less than 1" (25mm) and saw-cut edges to prevent feather edging of fill material.
 - 5. Repair concealed formed surfaces, where possible, containing defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
 - 6. Clean out form tie holes and fill with dry pack mortar or precast cone plugs secured in place with bonding agent.
 - 7. If honeycombing exposes reinforcement, chip to provide clear space at least 3/4" (20mm) wide all around steel to allow proper bond.
- H. Repairing Unformed Surfaces:
 - 1. High and Low areas in concrete surfaces which are in excess of specified tolerances shall be leveled or ground-smooth.
 - a) Correct high areas by grinding after concrete has cured at least 14 days.
 - b) Correct low areas by applying leveling material. Finish leveling material as specified in this section.
 - 2. Repair surfaces containing defects that affect durability of concrete.
 - a) Surface defects include crazing, cracks as defined above, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

3. Repair defective areas, except random cracks and single holes not exceeding 1" (25mm) in diameter, by cutting out and replacing with fresh concrete.
 - a) Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4" (20mm) clearance all around.
- I. Filling In: Fill in holes and openings left in concrete for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place.

3.08 EVALUATION AND ACCEPTANCE OF CONCRETE

- A. In accordance with ACI 301, except where otherwise specified.
- B. If, at any time during construction, the concrete resulting from the approved mix design deviates from Specification requirements for any reason, such as lack of workability, or insufficient strength, the Contractor shall have his laboratory verify the deficiency and modify the mix design, until the specified concrete is obtained. Modified mix to be submitted for approval per Part 1 - SUBMITTALS.

3.09 COORDINATION & CORRECTIVE MEASURES

- A. Conflicts: The Contractor shall be solely responsible for errors of detailing, fabrication, and placement of reinforcement steel; placement of inserts and other embedded items; and the structural adequacy of all formwork.

END OF SECTION

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SECTION 03 3511 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.

1.03 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- D. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.06 MOCK-UP

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.08 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

- A. Unless otherwise indicated, all concrete floors are to be finished using polished concrete finish.
- B. **CONC-3: Broom Finish with Penetrating Clear Sealer.**
 - 1. Use at following locations: Apparatus Floor.
- C. **CONC-2: Polished Finish.**

2.02 COATINGS

- A. Penetrating Sealer
 - 1. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blends with 3.3 lb/gal. or less of VOCs.
 - a. Products:
 - 1) Monopole Inc.; Aquaseal.
 - 2) Hydrozo, a division of ChemRex; Enviroseal 7.
 - 3) ProSoCo, Inc.; Saltguard WB.
 - 4) Sonneborn Building Products, a division of ChemRex; White Roc 10 WB.

2.03 POLISHED CONCRETE SYSTEM

- A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
 - 1. Acceptable Systems:
 - a. ARDEX Engineered Cements; ULTRAFLOOR Polished Concrete System; ARDEX PC-T Concrete Topping; ARDEX PC Finish sealer: www.ardexamericas.com.
 - b. L&M Construction Chemicals, Inc., a subsidiary of Laticrete International, Inc.; FGS Permashine Concrete Polishing System: www.lmcc.com.
 - c. L.M. Scofield Company; SCOFIELD Formula One Ground & Polished Concrete Systems: www.scofield.com.
 - d. or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

3.04 CONCRETE POLISHING

- A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
 - 1. Final Polished Sheen: Satin finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.
- B. Protect finished surface as required and as recommended by manufacturer of polishing system.

END OF SECTION

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SECTION 03 4001 - PRECAST CONCRETE AMENITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. Types of precast concrete work include:
 - 1. CONC-6: Precast Concrete Stair Treads
- B. Setting material, grouts, sealants and caulks.
- C. Installation of precast concrete stair treads.
- D. Related work not specified under this section.
 - 1. Installation of steel units to receive precast concrete.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C-150 Standard Specification for Portland Cement
 - 2. ASTM C-33 Standard Specification for Concrete Aggregates
 - 3. ASTM C-260 Standard Specification for Air-Entraining Admixtures for Concrete
 - 4. ASTM C-494 Standard Specification for Chemical Admixtures for Concrete
 - 5. ASTM C-128 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate
 - 6. ASTM C-31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
- B. Precast/Prestressed Concrete Institute (PCI)
- C. American Concrete Institute (ACI) 1. ACI-318

1.04 SUBMITTALS

- A. Shop Drawings
 - 1. Submit shop drawings of all precast concrete items showing detail sections and profile for all precast items. Details shall show all reinforcing and special hardware required for fastening.
- B. Samples
 - 1. Submit 1 sample, 6" x 6" size.
 - 2. Match architect's sample for color and texture.
 - 3. Submit copy of Quality Assurance and Procedure Program.

- C. Performance Requirements
 - 1. Compressive Strength 5000 p.s.i.
 - 2. Air Content 6-8%
 - 3. Water-Cement Ratio. 45:1
- D. Certification
 - 1. Suppliers shall furnish certification attesting that materials meet specification requirements.
- E. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Instructions: In addition to specified requirements, comply with precast concrete manufacturer's instructions and recommendations for substrate preparation, material storage, mixing and application, finishing and curing.
- B. Qualifications: Precast Concrete Manufacturer and Trade Contractor must have a minimum of 3 years of successful experience on projects of similar magnitude and complexity to that indicated on the project.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packaging and Shipping: Precast concrete to be palletized and shrink wrapped, delivered in original unopened packaging with legible manufacturer identification, including size, piece number, quantities, manufacture date and inspectors initials.
- B. Storage and Protection: Precast concrete to be stored in secure area in original packaging. Protect from damage by other trades.

1.07 WARRANTY

- A. Manufacturer/Installer shall warrant installed system for a period of 2 years from date of substantial completion against failure of workmanship and materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C-150 specifications for Portland Cement.
- B. Aggregates: All aggregates to meet ASTM C-33 specifications, cleaned and properly graded to size. Aggregates shall be blended to meet individual project requirements.
- C. Coloring: Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.
- D. Reinforcement and Hardware
 - 1. To conform with ACI and manufacturer's design.

2. Reinforce precast with deformed rods or wire, or both, as recommended by precast concrete manufacturer.
- E. Caulks and Sealants
 1. Polyurethane or acrylic sealant
 2. Color to be selected by architect from standard color pallet.
- F. Sealer: Colorless, pure acrylic water-repellent penetrating sealer. Sealer to maintain natural look of concrete surface with no glaze or gloss, darkening or color change.

2.02 MANUFACTURED UNITS

- A. Sizing Tolerances
 1. All units to conform to shop drawings, with a 1/8" tolerance in dimension.
- B. Precast Surfaces and Edges
 1. All exposed edges to have minimum 1/8" chamfer to prevent chipping.
 2. Finished surfaces to match approved control sample.
 3. All precast concrete finished surfaces to be sealed with a sealer approved by manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas to receive precast concrete for the following:
 1. Defects in existing work or substrate.
 2. Deviation beyond allowable tolerances for the substrate.
- B. Start work only when defects have been corrected by others.

3.02 INSTALLATION

- A. Setting
 1. Set accurately as shown on approved shop drawing. Setting methods are:
 - a. Bolt
 - b. Setting Clips/Hangers
 - c. Tab Set
 2. Alignment of precast should be straight and true to all dimensions. It may not vary more than 1/8" in length, height or width.
 3. Install anchors as shown on details.
- B. Protection
 1. Upon completion, the work shall be ready for final inspection and acceptance by the owner or owner agent.
 2. Contractor shall protect the finished work from the time the installing contractor completes the work.
- C. Finish
 1. Overall uniformity in matrix and aggregate.

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2. All product to be sealed with approved sealer.

END OF SECTION

SECTION 03 4100 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.01 GENERAL

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract.

1.02 SCOPE

- A. This work includes the requirements for the design, fabrication, delivery, and installation of precast, reinforced and prestressed concrete. The project includes hollow-core slab units, precast beams, and solid and insulated precast wall panels.

The Work includes, but is not limited to

- 1. Concrete Materials
- 2. Hardware, Metal Inserts and Embedments
- 3. Box-outs and Openings Required by Other Trades
- 4. Formwork
- 5. Furnishing and placement of Prestressed and Bar Reinforcement
- 6. Mixing and placing Concrete
- 7. Surface Finish
- 8. Precast Quality Control, Inspection and Testing
- 9. Handling and transportation of Precast Components
- 10. Openings indicated on design Drawings
- 11. Prestressed and Bar Reinforcement Placement Drawings and Fabrication
- 12. Precast Erection
- 13. Sealing of Joints as indicated on design Drawings, including between precast panels and between precast and cast-in-place elements.
- 14. Patching of Joints

1.03 RELATED WORK SPECIFIED IN OTHER SECTION

- | | |
|---|------------------------|
| A. Submittals | DDC General Conditions |
| B. Quality Control | DDC General Conditions |
| C. Concrete Formwork | Section 03 1000 |
| D. Concrete Reinforcement and Embedded Assemblies | Section 03 2000 |
| E. Cast-in-Place Concrete | Section 03 3000 |
| F. Structural Steel | Section 05 1200 |
| G. Thermal Insulation | Section 07 2100 |
| H. Joint Sealers | Section 07 9005 |
| I. Glazing | Section 08 8000 |

- | | | |
|----|----------------------|-----------------|
| J. | Louvers | Section 08 9100 |
| K. | Painting and Coating | Section 09 9000 |

1.04 REFERENCE STANDARDS

A. Standards:

1. Prestressed Concrete Institute (PCI) - MNL 116 - Manual for Quality Control for Plants and Production of Structural Precast and Prestressed Concrete Products.
2. Prestressed Concrete Institute (PCI) - MNL 120 PCI Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute.
3. Prestressed Concrete Institute (PCI) - MNL 123 - Design and Typical Details of Connections for Precast and Prestressed Concrete.
4. Prestressed Concrete Institute (PCI) - MNL 124 - Design for Fire Resistance of Precast Prestressed Concrete.
5. Prestressed Concrete Institute (PCI) - MNL 126 - Manual for The Design of Hollow Core Slabs.
6. PCI MNL 127 - Recommended Practice for Erection of Precast Concrete.
7. Prestressed Concrete Institute (PCI) - MNL 135 - Tolerance Manual For Precast and Prestressed Concrete Construction.
8. Prestressed Concrete Institute (CERT) - PCI Plant Certification; online at www.pci.org.
9. AASHTO M 251 - Specification for Plain and Laminated Elastomeric Bridge Bearings.
10. ACI 301 - Specifications for Structural Concrete and Commentary; American Concrete Institute.
11. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
12. ACI 309R - Guide for Consolidation of Concrete.
13. ACI 318 - Building Code Requirements for Structural Concrete and Commentary. American Concrete Institute International.
14. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
15. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
16. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
17. ASTM A416/A416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
18. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
19. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
20. ASTM C33 - Standard Specification for Concrete Aggregates.
21. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete. American Welding Society D1.1 - Structural Welding Code - Steel.
22. American Welding Society B2.1 - Specification for Welding Procedure and Performance Qualification; American Welding Society.
23. AWS D1.1/D1.1M 2010 - Structural Welding Code - Steel; American Welding Society.
24. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; . American Welding Society.
25. IBC - International Building Code.

B. Definitions

1. See Section 033000.

1.05 WELDER QUALIFICATIONS

- A.** Qualify the welding procedures, shop welders, field welders, welding operators and tackers in accordance with AWS D1.1 and for the following periods of effectiveness of certification:
1. Certification and qualification, including period of effectiveness of welding personnel shall be as specified by AWS D1.1. Certification shall remain in effect for duration of work provided welders

are continuously engaged in performing the type of welding for which they are certified, unless welders fail to perform acceptable welding, as determined by the Testing Agency. Certification and re-certification of welding personnel is subject to verification by the Testing Agency. Re-testing for re-certification will be the Contractor's responsibility.

1.06 REQUIREMENTS OF REGULATORY AGENCIES

- A. Manufacture and installation of structural precast concrete to meet requirements of the 2014 City of New York Building Code. All local codes plus the specifications, standards and codes identified in Section 1.3 are a part of these specifications.

1.07 SUBMITTALS

- A. Required Submittals – Where the SUBMITTALS section of this Specification is in conflict with DDC General Conditions, the more stringent requirements for the contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested.

- (1) Concrete Mix Designs
- (2) Shop Drawings
- (3) Structural Design Calculations
- (4) Welder Certifications
- (5) Product Data
- (6) Hazardous Materials Notification

1. **Concrete Mix Designs:** Submit Mix design reports for approval, with all data as specified in Section 033000.
2. **Shop Drawings:** Submit for approval of sizes and arrangement of components. Drawings should clearly indicate, but are not limited to:
 - a) Layout, dimensions, sections through members and assemblies, joint and corner details, type and location of all inserts, reinforcing, prestressing tendons, strength of concrete, fastening and anchoring details, including clearances, and details of attachment to other work. Coordinate location of hanger tabs and devices for mechanical and electrical work and cutting of field openings. Indicate finishes, form types and other pertinent information.
 - b) Erection schedules and sequences, assembly techniques, and marking of members.
 - c) Fabrication, bending and placement of concrete reinforcement. Include all reinforcement required and openings through concrete structures.
 - d) Dimensions, size and location of openings.
 - e) Quantities, location of stressing force of prestressing tendons.
 - f) Locations and details of connections, edge conditions and support conditions of precast units.
 - g) Inserts (including lifting and erection inserts), attachments, and embedments.
 - h) Anticipated cambers at time of erection.
 - i) Strength of concrete at prestressing and at time of erection.
 - j) Elongation for prestressing and at erection.
 - k) Caulked sealed joints.
 - l) Location, extent and reinforcing of any cast-in-place concrete on top of precast.
 - m) All areas of connections, embedments, etc. required to be sealed or caulked.
 - n) Field installed anchor locations.
3. **Structural Design Calculations:** Submit structural design calculations for record signed and sealed by the contractor's Professional Engineer licensed in the state of New York. Each change of component configuration and design shall have its own set of calculations.
 - a) The precast structural elements will be designed to coordinate with the parameters set forth by the contract documents.

- b) Precast structural elements shall be designed for all gravity wind and seismic loads indicated on the drawings.
 - c) In addition to the loads on the drawings, the design of the precast structural elements shall consider all stresses resulting from shipping, handling and erection, thermal loads, and other effects such as creep and shrinkage
 - d) Any changes required to the structural system, and/or architectural drawings to suit the proposed precast designs, if accepted by the Commissioner, will be based on the contractor bearing all costs of such changes including the redesign costs of the Commissioner.
 - e) The design shall properly account for the concentration and distribution of loads due to openings.
 - f) Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage. Design joints to accommodate the critical load combination to prevent internal stress, failure, deterioration or failure of weather seals or precast.
 - g) Design units to accommodate construction tolerances, deflection of building structural members and clearance of intended openings.
 - h) Precast structural concrete components shall be designed for the fire ratings indicated on the architectural drawings.
4. **Welder Certification:** See Section 051200.
5. **Product data:** Submit for record only manufacturer's product data, including specifications and installation instructions clearly marked to indicate all technical information, including load tables where applicable, that specifies full compliance with requirements of this section and Contract Documents for each type of insert, accessory and product specified.
6. **Hazardous Materials Notification:** In the event no product or material is available that does not contain asbestos, PCB or other hazardous materials as determined by the Commissioner, submit for record a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 for the proposed product or material, prior to installation.
7. **Samples:** Submit two samples, 12 x 12 inch in size, illustrating surface finish, color and texture to match Commissioner's control sample.

B. Design Deviations

- 1. Design deviations will be permitted only after the Commissioner's written approval of the manufacturer's proposed design and after submittal of complete design calculations and drawings.
- 2. Design deviations shall provide an installation equivalent to the design intent without incurring additional cost to the Commissioner.
- 3. Variations in details or materials shall not adversely affect the appearance, durability, or structural capacity of the units.

1.08

STORAGE AND DELIVERY

A. Comply with DDC General Conditions, including the following:

- 1. Store all units in such a way to prevent contact with the ground.
- 2. Place stored units so that identification marks are discernible.
- 3. Separate stacked members by battens across full width of each slab unit.
- 4. Stack so that lifting devices are accessible and undamaged.
- 5. Do not use upper member of stacked tier as storage area for shorter member or heavy equipment.
- 6. Precast units shall be lifted and supported during manufacturing, stockpiling, transporting, and erection operations only at the lifting or supporting point, or both, as shown on the shop drawings, and with approved lifting devices. Lifting inserts shall have a minimum safety factor of 4. Exterior lifting hardware shall have a minimum safety factor of 5.

7. Transportation, site handling, and erection shall be performed with acceptable equipment and methods, and by qualified personnel.
8. Exposed concrete units shall be adequately protected by padding or other means to prevent staining, chipping, or spalling of concrete

1.09 PRECAST PRE-INSTALLATION CONFERENCE

- A. At least twenty (20) working days prior to commencing the installation/erection of the precast the contractor shall hold a meeting to review the detailed requirements of the precast installation.
- B. The contractor shall prepare an agenda and require responsible representatives of every party who is concerned with the precast installation to attend the conference, including but not limited to the following:
 1. Precast Installer
 2. Contractors installing associated work
 3. Precast Fabricator
 4. All Testing and Inspection Agencies
 5. Commissioner
 6. Steel contractor as appropriate
- C. Minutes of the meeting shall be recorded, typed and distributed by the contractor to all parties listed above with 5 working days of the meeting.
- D. The minutes shall include a submission schedule for approval, discussion on sealants and formwork, compatibility of form coatings to be used that may affect bonding of sealants, and testing.
- E. Notwithstanding any provision of the Specification, the Commissioner shall not be responsible for and not have charge over any safety programs or precautions at the site of the project.

1.10 QUALITY ASSURANCE BY TESTING AGENCY

- A. For precast concrete furnished under this Section, quality control inspection and testing shall occur during the manufacture of the components, and the components are subject to the approval of the precast supplier's Quality Control Manager and Testing Agency.
- B. Structural precast concrete will meet the standards of Special Inspections as per IBC
- C. Testing and Inspection will be in accordance with PCI MNL-116 Requirements.
- D. Before shipment, all precast components shall be inspected to make certain all necessary inspection has occurred and the materials and workmanship conform to the requirements of these specifications. Copy of the written inspection reports shall be submitted to the Commissioner for record.

1.11 QUALITY ASSURANCE BY CONTRACTOR

- A. Qualification Data: Submit for record qualification data for the Precast Fabricator ("Fabricator"), Contractor's Engineer(s) and Precast Erector ("Erector").
- B. The design of all precast structural concrete is the responsibility of the contractor and shall be performed under the supervision of a Licensed Professional Engineer licensed in the state of New York, and experienced in design of precast concrete structures.
- C. The Professional Engineer responsible for the design of the precast structural concrete shall be responsible for the implementation of the design by reviewing the fabrication process to assure conformance with the design. The Professional Engineer at the end of the construction shall issue a written statement signed and sealed certifying the conformance with design. This certification must

meet the standards of review of special inspection of IBC Section 1704 subsection 1705.4.2.1 exceptions. This certification is in addition to any quality assurance program for special inspection established by the Testing Agency.

- D. The Fabricator 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.
- E. Fabricator must be producer member of Precast Concrete Institute (PCI) and participate in its Plants Certification Program. The contractor must satisfy the standards of the PCI Plants Certification program. The basis of this conformance shall be the PCI Plant Certification and Quality Control Program.
- F. The Erector 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.
- G. Insulated Panel Manufacturer Qualifications: Company specializing in manufacturing integrally insulated panel system specified in this section, with not less than three years of documented experience and approved by system manufacturer. Precast concrete fabricator shall be accredited by IAS according to IAS AC157.

1.12 QUALITY CONTROL BY CONTRACTOR

- A. Concrete components shall be cast under controlled conditions. Forms shall be rigidly constructed, straight, square, true and designed for close control of dimensions and details.
- B. All precast units shall be produced at a fabricating plant engaged primarily in manufacturing of similar units.
- C. The finished product shall be lifted and/or supported at the points shown on the shop drawings or at the support points of the member when it is put into service.
- D. Produce precast concrete units only at fabricating plant engaged primarily in manufacturing of similar units.

1.13 JOB MOCKUP

- A. See architectural documents for exterior wall panel mockup. Pricing for one pre-erection mockup should be included in cost estimates.
- B. Mockup to include architecturally finished panel with typical window installation.

1.14 OBSERVATIONS AND CORRECTIONS BY COMMISSIONER

- A. Design modifications may be made only as necessary to meet field conditions and to ensure proper fitting of the Work, and only as acceptable to the Commissioner. Maintain general design concept shown without increasing or decreasing sizes of members or altering profiles and alignment shown. Submit for record complete design calculations and drawings prepared and stamped by a Professional Engineer licensed in the state of New York, if design modifications are anticipated.

1.15 WARRANTY

- A. Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period.
- B. Defective material and workmanship include but are not limited to:
 - 1. Abnormal deterioration, aging or weathering of the work, including spalling or evidence of visible warping or cracking.
 - 2. Water leakage under conditions equivalent to, or less severe than those specified.
 - 3. Structural failure due to pressures and forces under specified limits.
 - 4. Sealant loss of adhesion, loss of cohesion, cracking or discoloration.
 - 5. Collapse of thermal insulation or safin insulation.
 - 6. Staining of precast panels by selant or primer.

PART 2 - PRODUCTS

2.01 PRECAST UNITS

- A. The project includes the following precast units:
 - 1. Hollow Core Plank: Precast, prestressed concrete units with open, hollow cores running the full length of the slab units.
 - 2. Precast, prestressed concrete beams
 - 3. Structural insulated concrete wall panels to achieve the insulative properties identified by the architectural and mechanical engineer's drawings.
 - 4. Solid structural wall panels
- B. Furnish units free of voids or honeycombs.
- C. Sand blast exposed-to-view precast unit surfaces to light exposure. Protect adjacent surfaces. Seal exterior precast surfaces with anti-graffiti coating, PT-7. Include cast-in weld plates and embedments where required.
- D. Coordinate with other trades for installation of cast-in items.
- E. Provide headers of cast-in-place concrete or structural steel shapes for openings larger than one slab unit width according to hollow-core slab unit fabricator's recommendations.

2.02 CONCRETE

- A. Cement shall be Portland Cement as specified in Section 033000/Concrete.
- B. Supplementary Cementitious Material shall be as specified in Section 033000/Concrete.
- C. Concrete aggregates shall conform to ASTM C 33. The size of coarse aggregates in the concrete shall meet the spacing requirements of prestressing steel and/or reinforcing steels. The size of the coarse aggregate shall be no larger than 3/4" (size No. 67 per ASTM C 33).
- D. Air Entrainment, water-cementitious materials, slump and admixtures shall be as specified in Section 033000.
- E. Cement and aggregates shall be stored in such a manner as to prevent their deterioration or the intrusion of foreign matter. Any materials which have deteriorated or which have been contaminated shall not be used for concrete.
- F. Use of calcium chloride, chloride ions or other salts is not permitted.

- G. Concrete shall have a minimum 28-day compressive strength of 5000 psi, and a release strength of 3000 psi, or as specified on the drawings. Precast concrete shall have a resistance of not less than 3000 coulombs as per AASHTO-T277.

2.03 GROUT

- A. Nonshrink Grout: See Section 033000.
- B. Epoxy-resin grout; Two-component mineral-filled epoxy-resin: ASTM C 881 or FS MMM-A-001993

2.04 REINFORCEMENT

- A. Materials, fabrication, etc., for reinforcing shall meet applicable ASTM standards as specified in Section 032000/Concrete Reinforcement and Embedded Assemblies.
- B. Reinforcing Bars - ASTM A615, Grade 60.
- C. Welded Plain Wire Fabric - ASTM A185.
- D. Prestressing Strand - ASTM A 16, uncoated seven-wire stress-relieved strand, with a minimum tensile strength of 270,000 psi.
- E. Weldable deformed steel - ASTM A706.
- F. Coatings where noted on plan.
 - 1. Epoxy bars: ASTM A 775

2.05 CONNECTION MATERIALS AND EMBEDDED ITEMS

- A. Steel Shapes and Plates: ASTM A36 minimum.
- B. Bolts and Studs: ASTM A307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.
- C. Welded Headed Studs: AWS D1.1, Type B headed studs, cold-finished carbon-steel bars.
- D. Deformed-Steel Wire Bar Anchors: ASTM A496.
- E. Welding Electrodes: Comply with AWS requirements.
- F. Accessories: Provide clips, galvanized steel hangers, shims, and other accessories required to install precast concrete units.
- G. Sill Seal: Compressible glass fiber strips.
- H. Shop-Primed Finish: Prepare surfaces of interior steel items, except those with galvanized finish, or to be welded, or those surfaces to be embedded in concrete, according to requirements of SSPC-SP 3 and shop-apply primer according to SSPC-PA 1.
 - 1. Primer: Fast-curing, lead- and chromate-free, VOC-conforming, universal modified-alkyd primer with good resistance to normal atmospheric corrosion.

2.06 BEARING PADS/STRIPS

- A. Provide bearing pads for precast concrete units as follows:
 - 1. Bearing pads not susceptible to movement beyond that of flexure of the member shall be AASHTO grade 100% chloroprene (neoprene) or approved equal meeting the requirements of AASHTO standard specifications for Highway Bridges.

2. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 shore A durometer.
3. Random Oriented Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 shore A durometer. Shall support a compressive stress of 3000 psi with no cracking, splitting or delaminating in the internal portions of the pad. One specimen shall be tested for each 200 pads use in the project.
4. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric, bonded in elastomer. Surface hardness of 80 to 100 shore A durometer.
5. High-Density Plastic: Multi-monomer, nonleaching, plastic strip and support construction loads with no visible expansion.

2.07 FORMWORK

- A. Provide forms and, where required, form facing materials of metal, plastic, wood, or other acceptable material that is non-reactive with concrete and will produce required finish surface.
- B. See architectural precast specification for form liner requirements.

2.08 CURING COMPOUND

- A. The compound shall be in accordance with ACI 533 and compatible with "Hydrozo Enviroseal 40" sealing compound or equal. See Section 033000.
- B. Sealing Compound: Sydrozo Enviroseal 40 sealing compound or approved equal. See Section 033000.

2.09 SOURCE QUALITY CONTROL

- A. The Testing Agency will evaluate precast fabricator's quality control and testing methods.
 1. Allow Testing Agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Testing Agency and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.
- B. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL-116 requirements.
- C. Compressive strength shall be based on tests of cylinders made and tested in accordance with ASTM methods as prescribed in ACI 318 Chapter. See Section 033000 of this Specification.
- D. Strength of precast concrete units will be considered potentially deficient when precast concrete units fail to comply with requirements, including the following:
 1. Fail to meet compressive-strength test requirements.
 2. Reinforcement, and pretensioning and detensioning tendons of prestressed concrete do not conform to fabrication requirements.
 3. Concrete curing and protection of precast units against extremes in temperature fail to meet requirements.
 4. Precast units are damaged during handling and erecting.
- E. Testing: When there is evidence that the strength of precast concrete units may be deficient or may not meet requirements, the Testing Agency will obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42.
 1. A minimum of 3 representative cores will be taken from precast concrete units of suspect strength, from locations directed by Commissioner.
 2. Cores will be tested in an air-dry condition per ACI 301 when precast concrete units will be dry under service conditions.

3. Strength of concrete for each series of 3 cores will be considered satisfactory if the average compressive strength is at least 85 percent of the 28-day design compressive strength and no core compressive strength is less than 75 percent of the 28-day design compressive strength.
 4. Test results will be made in writing on the same day that tests are made, with copies to Commissioner, Contractor, and precast fabricator. Test reports will include the Project identification name and number, date, name of precast concrete fabricator, name of concrete testing agency; identification letter, name, and type of precast concrete unit or units represented by core tests; design compressive strength, compressive strength at break and type of break, corrected for length-diameter ratio, and direction of applied load to core with respect to horizontal plane of concrete as placed.
- F. Patching: Where core test results are satisfactory and precast concrete units meet requirements, solidly fill core holes with patching mortar and finish to match adjacent concrete surfaces.
- G. Dimensional Tolerances: Units having dimensions smaller or greater than required and not meeting tolerance limits may be subject to additional testing.
1. Precast units having dimensions greater than required will be rejected if the appearance or function of the structure is adversely affected or if larger dimensions interfere with other construction. Repair or remove and replace rejected units, as required, to meet construction conditions.
- H. Defective Work: Precast concrete units that do not conform to requirements, including strength, manufacturing tolerances, and finishes, are unacceptable. Replace with precast concrete units that meet requirements.

2.10 LEED REQUIREMENTS

- A. See LEED REQUIREMENTS Section 033000.

PART 3 - EXECUTION

3.01 FABRICATION TOLERANCES

- A. Listed below are generalized tolerances taken from the referenced standards
1. Overall dimension - The numeral greater of $\pm 1/16"$ per 10 ft. or $\pm 1/8"$ (PCI).
 - a) Cross-sectional dimensional (ACI):
 - b) Section less than 6", $\pm 1/8"$.
 2. Section over 6" and less than 18", $\pm 3/16"$.
 3. Squareness (PCI) - $1/8"$ in 6 ft. out of square as measured on the diagonal.
 4. Deviation from specified camber (ACI) - Precast, $1/16"$ per 10 ft. of span; Prestressed, $1/8"$ per 10 ft. of span. Differential camber between adjacent units shall not exceed $3/8"$.
 5. Deviation from straight line in long section (ACI) - Not more than $1/8"$ per 10 ft.
 6. Warpage (PCI) - $1/8"$ per 6 ft. of length.
 7. Variation in size and locations of sleeves and openings (ACI) - $1/4"$.
 8. Location of anchors and inserts (PCI) - $3/8"$ off center line location shown on drawings.
- B. Shop drawings shall explicitly show tolerances on major dimensions. Include length, width, thickness and diagonals. A note summarizing the other above mentioned tolerances shall be indicated on shop drawings.

3.02 FABRICATION AND PLACEMENT OF REINFORCEMENT

- A. Formwork: Accurately construct forms, mortar-tight, and of sufficient strength to withstand pressure due to concrete placing operations, temperature changes and, when prestressed, pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of shape, lines and dimensions indicated, within specified fabrication tolerances.
- B. Unless forms for plant-manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or to movement during detensioning.
- C. Placing and supporting the reinforcing steel shall be in accordance with Concrete Reinforcing Steel Institute's "Recommended Practice for Placing Bar Supports Specifications and Nomenclature", and with applicable sections of ACI 318.
- D. Do not use metal chairs, with or without coating, in the finished face.
- E. Reinforcement to be welded shall conform with AWS D1.4.
- F. The spacing of prestressing strands at the ends of the component shall be the largest of the following:
 - 1. The center to center distance of prestressing strands shall be not less than three times the strand diameter.
 - 2. The clear spacing between strands shall not be less than 1-1/3 times the maximum size of coarse aggregates.
- G. Pretensioning: Pretension tendons for precast, prestressed concrete either by single-strand tensioning method or multiple-strand tensioning method. Comply with PCI MNL-116 requirements.
- H. Built-In Anchorages: Accurately position built-in anchorage devices and secure to formwork. Locate anchorages where they do not affect the position of the main reinforcement or placing of concrete. Do not relocate bearing plates in units, unless acceptable to Commissioner.
- I. Cast-in openings 6 inches in diameter (or larger) or 6 inches square (or larger) according to final shop drawings. Other smaller holes may be field cut by trades requiring them, as acceptable to Commissioner and provided the smaller openings do not conflict with prestressed reinforcement. All field openings must be located at least 2 inches from prestressed reinforcement. Should spalling occur, it shall be repaired by the trade performing the drilling.
- J. The concrete cover shall be as shown on the drawings or as per Chapter 7 of ACI 318.
- K. The surface condition of all reinforcement shall be clean and free of oil and substances harmful to bond. Special care shall be exercised with prestressing strands.

3.03 CONCRETE PLACEMENT

- A. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast units. Comply with requirements of ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with ACI 309R.

3.04 CURING

- A. The slab must be cured by either a continuous moist curing method approved by the Commissioner or by using curing compound.

- B. Wet cure shall be by continuous fog spray or immersion in water. Do not use curing compounds on surfaces to be wet cured.

3.05 PRESTRESSING STEEL

- A. Prestressing steel shall be detensioned so that force in the prestressing steel shall be transferred to the concrete by releasing all strands simultaneously or by cutting individual strands. If the force in the strand is transferred individually, a sequence release and corresponding calculations prepared by the contractor's Professional Engineer shall be submitted for record to avoid subjecting the member to damaging stresses.

3.06 FINISH

- A. Refer to architectural drawings for finish requirements.
- B. Component surfaces shall be formed and texture in conformance with this specification.
- C. Standard underside
 - 1. Resulting from casting against approved forms using good industry practice in cleaning of forms, design of concrete mix, placing and curing.
 - 2. Small surface holes caused by air bubbles, normal color variations, normal form joint marks and minor chips and spalls shall be tolerated, but no major or unsightly imperfections, honeycomb, or other defects will be permitted.
- D. Standard top
 - 1. Finish unformed surfaces by trowel, unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
 - a) Apply scratch finish to precast concrete units that will receive concrete topping after installation. Following initial strike-off, transversely scarify surface to provide ridges approximately 1/4 inch deep.
- E. Blockouts shall be removed prior to shipment.
- F. Inserts shall be free of contaminants and burrs.

3.07 PRE-INSTALLATION INSPECTION

- A. Testing Agency shall examine the areas and conditions where precast structural concrete is to be installed and notify the Commissioner of conditions detrimental to the proper and timely completion of the Work. Contractor shall not proceed with the Work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the Commissioner.

3.08 ERECTION

- A. All precast units shall be erected level, plumb, square and true so that no cumulative dimensional errors occur.
- B. Install precast units with camber upward.
- C. Install bearing pads and sill seal at bearing ends of planks as indicated.
- D. As erection progresses, align and maintain uniform horizontal and end joints.
- E. Adjust differential camber/elevation between precast members to tolerance before final attachment and grouting.

- F. Grout longitudinal keys as indicated and tape seal underside of plank joints to prevent grout leakage.
- G. The erector shall be responsible for any chipping, spalling, cracking or other damage to the units after delivery to the job site and until installation is completed.
- H. The erector shall be responsible for damage to Work and materials of other trades.
- I. Shore and brace precast concrete units to maintain location, stability, and alignment until permanent connections are installed.
- J. Site preparation. The contractor shall be responsible for the following:
 - 1. Providing true, level bearing surfaces on all field placed bearing walls and other field placed supporting members
 - 2. Placement and accurate alignment of anchor bolts, plates or dowels in column footings, grade beams and other field placed supporting members.

3.09 ERECTION TOLERANCES

- A. Prior to the erection of the precast components, all configurations, shape and top elevations of support points for the precast components shall be surveyed and verified. In case of conflicts, immediately notify the Commissioner prior to commencing the erection of the precast components.
- B. Tolerances for Location of Precast Units - Fabricate and erect precast units so that joints between panels meet the following:
 - 1. Face width of joints - plus or minus 3/16".
 - 2. Joint taper - 1/40" per foot length, with maximum length of tapering in one direction of 10'.
 - 3. Step in face - 1/4".
 - 4. Jog in alignment of edge - 1/4".
 - 5. Alignment for exterior panels is outside face.
 - 6. Variation from plumb - plus or minus 1/2" in any 40' run.
 - 7. Variation from level - plus or minus 1/2" in any 40' run.
 - 8. Differential camber of adjacent pieces after erection under 1/4" for precast tees in driveways or pedestrian path and 3/8" elsewhere.

3.10 INSTALLATION

- A. Bearing Pads: Install bearing pads as precast concrete units are being erected. Set pads on true, level, and uniform bearing surfaces and maintain in correct position until precast units are placed.
- B. Alignment: Members shall be properly aligned and leveled. Variations between adjacent members shall be reasonably leveled out by jacking, loading, or any other feasible method as recommended by the manufacturer and accepted by the Commissioner.
- C. Welding: Perform welding in compliance with AWS D1.1 and AWS D1.4.
 - 1. Protect precast concrete units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.
 - 2. Repair damaged metal surfaces by cleaning and repriming damaged painted surfaces.
- D. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed units, unless otherwise acceptable to Commissioner.

3.11 GROUTING

- A. Grout open spaces at keyways, connections, and joints as indicated or required except for items grouted by other trades.

- B. Mix non-shrink grout with sufficient water to cause it to flow under its own weight. See Section 033000.
- C. Place fluid grout from one side and puddle for complete filling of voids; do not remove dams or forms until grout attains initial set. Finish exposed surfaces smooth and cure with damp burlap at least 3 days.

3.12 PATCHING

- A. Patch and feather all joints to the satisfaction of the Commissioner. First patch, approved by Commissioner, will be considered standard of quality for subsequent patching. Proposed patching procedure shall be submitted to the Commissioner for review.

END OF SECTION

SECTION 04 2000 - UNIT MASONRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Concrete Block.
- B. Mortar.
- C. Reinforcement and Anchorage.
- D. Flashings.
- E. Accessories.

1.03 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 07 1113 - Bituminous Dampproofing: Dampproofing parged masonry surfaces.
- C. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.
- D. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- E. Section 07 8410 - Through-Penetration Fire Stop Systems: Firestopping at penetrations of fire-rated masonry.
- F. Section 07 8420 - Fire Resistive Joint Systems: Head of wall joints.
- G. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.04 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating [Hot-Dip] on Iron and Steel Hardware; 2009.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A641/A641M - Standard Specification for Zinc-Coated [Galvanized] Carbon Steel Wire; 2009a.

- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.
- F. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- G. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2011.
- H. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- I. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- J. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- K. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.
- L. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- M. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- N. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- E. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.

1.07 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
- B. Fire Rated Assemblies: Conform to applicable code for UL Assembly No. U905.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
 - 2. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 3. Provide square-edged units for outside corners, unless otherwise indicated.
 - 4. Non-Loadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
 - b. Lightweight.

2.02 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type N.
- B. Portland Cement: ASTM C150/C150M, Type I.
 - 1. Not more than 0.60 percent alkali.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Aggregate: ASTM C404.
- F. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 - 1. Blok-Lok Limited: www.blok-lok.com.
 - 2. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
 - 3. WIRE-BOND: www.wirebond.com.
 - 4. or approved equal.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

- E. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
 - 1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
- F. Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 0.05 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
- G. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

2.04 ACCESSORIES

- A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
- B. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.
- C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.05 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Interior, non-loadbearing masonry: Type O.

PART 3. EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners, except for units laid in stack bond.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- H. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.07 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 8 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.08 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Size control joints as indicated on drawings; if not shown, 3/4 inch wide and deep.

3.09 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, glazed frames, fabricated metal frames, and window frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.10 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.11 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

SECTION 05 1200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 GENERAL

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract.

1.02 SCOPE

- A. The work covered by this Section shall include all labor, material, equipment, permits, engineering and other services necessary for the fabrication and installation of structural steel and related work, complete, in accordance with the Drawings and as specified herein.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- | | | |
|----|----------------------|------------------------|
| A. | Submittals | DDC General Conditions |
| B. | Quality Control | DDC General Conditions |
| C. | Concrete | Section 033000 |
| D. | Steel Joists | Section 052000 |
| E. | Steel Deck | Section 053000 |
| F. | Miscellaneous Metals | Division 5 |
| G. | Fireproofing | Division 7 |
| H. | Painting | Division 9 |

1.04 CODES AND STANDARDS

- A. Building Code: Structural steel work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.
- B. Standards:
 - 1. American Institute of Steel Construction (ANSI/AISC 360) "Specification for Structural Steel Buildings" per Structural General Notes.
 - 2. ANSI/AISC 341 and 341s1- Seismic Provisions for Structural Steel Buildings, Including Supplement No. 1; American Institute of Steel Construction, Inc.
 - 3. American Institute of Steel Construction (AISC 303), "Code of Standard Practice", shall apply except:
 - a) In item 3.1.2 delete all references to item 4.4 and replace with the requirements of the project Specification.
 - b) Item 3.6 shall be deleted.
 - c) Item 4.4 shall be deleted, and replaced with the requirements of the project Specification.

- d) The second paragraph of item 7.10.3 shall be revised from "... Commissioner's designated representatives for design and construction" to "Commissioner's designated representative for construction or as indicated in the Contract Documents"
- e) The last sentence of items 8.5.2 and 8.5.4 shall be deleted.
- f) Item 8.5.3 shall be deleted. Where a conflict exists between the Code of Standard Practice and the Contract Documents, the Contract Documents shall govern.
- 4. American Welding Society, AWS D1.1, "Structural Welding Code".
- 5. Research Council on Structural Connections (RCSC) - "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
- 6. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein.
- 7. The Society for Protective Coatings (formerly Steel Structures Painting Council, "SSPC") "Steel Structures Painting Manual".

1.05 SUBMITTALS

- A. Required Submittals - Where the SUBMITTALS section of this Specification is in conflict DDC General Conditions, the more stringent requirements for the Contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested. Reproduction of structural drawings for shop drawings is not permitted. Building Information Models for contractor's use may be provided as mutually agreed upon by Commissioner.
- (1) Submittal Schedule
 - (2) Calculations, Shop Drawings and Erection Drawings
 - (3) Submittal Letters
 - (4) Pre-construction Survey
 - (5) Quality Control Program
 - (6) Product Data
 - (7) Samples
 - (8) Welding Procedures Specification (WPS)
 - (9) Welder Certifications
 - (10) Mill Reports
 - (11) As-built surveys
1. **Submittal Schedule:** The contractor shall submit for approval a typical connection design calculation and shop drawing submission schedule at least twenty (20) working days prior to commencing submission of connection design calculations and shop drawings.
- a) This schedule shall include a list, in order of date to be submitted, of all drawings and other required submittal items scheduled to be submitted. The schedule shall list the proposed submittals for each week, including but not limited to the number of calculation sheets, erection drawings, and piece drawings, as well as their formats. Once shop drawing submissions have commenced any modification or addition to this schedule must be submitted for approval at least twenty (20) working days before the modification or addition is proposed to take place.
 - b) For the purposes of developing a schedule, assume the following review rates:
 - Calculations - 100 - 8 1/2' x 11" sheets per week
 - Shop drawings - 300 pieces per week
2. **Calculations, Shop Drawings and Erection Drawings** (including Field Work drawings): Submit for approval required connection calculations, shop drawings and erection drawings for all structural steel indicated on the Contract Documents.
- a) Material shall not be fabricated or delivered before the shop and erection drawings have been approved or approved as noted by the Commissioner and returned to the Contractor.
 - b) Connection design calculations: Calculations are required for all details that are not indicated on the Drawings as "Completely Designed." Each calculation package shall be signed and sealed by the Contractor's Engineer.

- c) **Structural Steel Shop Drawings:** Submitted shop drawings shall include layouts and details for each member showing the steel type and grade, size, connections, cuts, copes, holes, bolts, welds, surface treatments (cleaning, shop paint, etc.) and provisions for the connection of other work, including working points and angles. Steel type, grade and size for all attached elements shall also be shown.
 - d) Shop and erection drawings shall contain complete dimensional and geometric information, based on established dimensions shown on Contract Documents, and shall not be scaled from Contract Documents. The shop drawings shall clearly distinguish between shop and field welds and bolts, identify pretensioned high strength bolts and identify surface preparation requirements at slip critical connections.
 - e) **Welds:** All welds shall be indicated by standard welding symbols in the "Standard Code for Arc and Gas Welding in Building Construction" or as accepted by the SER. Shop and erection drawings shall show the size, length, and type of each weld, including the electrode type to be used.
 - f) **Bolts:** Details for bolt assemblies shall indicate bolt size, length, type and the presence, type and location of washers where required as part of the assembly; distinguish between N and X bolts, distinguish between slip-critical and bearing bolts; specify approved slip critical coatings; and distinguish between shop and field bolts. Also, indicate bolt orientation where required by the Contract Documents.
 - g) **Erection Drawings:** The erection drawings shall include plans showing exact locations of base and bearing plates, and/or anchor rods and other embedded items. All field connections not specifically shown on shop drawings shall be shown on erection drawings, including field bolt size, type, number, location and any special installation requirements, and field weld size, type, length and location.
3. **Submittal Letters:** The Contractor shall submit for record letters from the Contractor's Engineer supervising the preparation of connection designs on shop and erection drawings.
- a) A letter shall be submitted along with the first submission of Connection design calculations. It shall be signed and sealed by the Contractor's Engineer, and shall include the following:

"All Connection design calculations for this project have been developed, and all details and connections for this project will be designed, by me, or by qualified personnel under my direct supervision, to resist the loads and reactions indicated on the Contract Documents, except for those connections which are designated as completely designed on the Contract Drawings."
 - b) A second letter shall be submitted upon the satisfactory submission, review and/or approval of all shop and erection drawings. It shall be signed and sealed by the Contractor's Engineer and include the following:

"All details and connections as shown on the final shop and erection drawings for this project have been designed by me, or by qualified personnel under my direct supervision, to resist the loads and reactions indicated on the Contract Documents, except for those connections which are designated as completely designed on the Contract Drawings."
4. **Preconstruction Survey:** Submit for record. Where interface with existing construction occurs, before related shop drawings are prepared survey the existing construction and submit the survey prepared by a professional surveyor employed by the Contractor to the Commissioner. For all steel construction, before steel erection commences, perform and submit to the Commissioner a complete survey for position and alignment at all points where construction by other trades will support steel elements, including but not limited to pockets, embedded plates, anchor rods and base plates. Include plan location positions relative to the building gridlines, and elevations of bearing surfaces and tops of bolts relative to building Datum elevation.
5. **Quality Control Program:** Submit for record complete details of the Contractor's quality control program including the names of the personnel responsible for this work.

6. **Product Data:** Submit manufacturers' specifications, test reports and applicable standards for all products listed under Part 2: Products. Standard literature shall be edited to suit job conditions.
7. **Samples:** Submit (2) samples each, (2) of shop painted products and (2) of field touch-up painted products. Samples shall be steel material.
8. **Welding Procedures:** Submit for record written welding procedures for all AWS D1.1 prequalified joints, and qualification procedures for all joints not prequalified by Section 3 of AWS D1.1. Submit written welding procedures developed by Contractor's welding consultant for heavy shapes and High Restraint Welds described in this Specification. Use the forms in AWS D1.1, Annex E. Submit all welding and qualification procedures to the Commissioner's Testing Agency for approval before submitting to the Commissioner.
9. **Welder Certification:** Submit for record certification that the welders have passed qualification tests acceptable to the City of New York using AWS procedures.
 - a) A certification shall be submitted in standard AWS format.
 - b) Each certification shall state that the welder has been doing satisfactory welding of the required type within the six-month period prior to the subject work.

For any welder whose period of certification effectiveness has lapsed or whose workmanship is subject to question in the opinion of the Commissioner or Testing Agency, immediate testing for recertification will be required. Tests, when required, shall be conducted at the sole expense of the Contractor.
10. **Mill Reports:** Submit for record certified copies of all mill reports, two (2) to the Commissioner and one (1) to the Testing Agency, covering the chemical and physical properties of all structural steel and accessories (as defined in this Specification) for the project.
 - a) Such certificates shall be obtained from the mills producing the steel and shall certify in a cover letter submitted with the certificates, that the steel meets the minimum requirements as to physical properties, inspection, marking and tests for structural steel as defined by the current edition of the relevant ASTM Standard Specifications. Any steel that does not meet the ASTM requirements must be clearly identified in a cover letter submitted with the certificates.
 - b) Prior to commencing steel erection, the contractor shall deliver certificates to the Commissioner in number and form as may be required by the local Building Department.
11. **As-Built Surveys:** Execute and submit for record a comprehensive survey of steel structure at each façade opening adequate to assess if the structure has been built within the tolerances specified in the Contract Documents. Each certified survey, performed by a professional surveyor employed by the Contractor, shall be submitted to the Contractor's Engineer for their approval before proceeding to the next stage of erection. If deviations from the tolerances are discovered, the Contractor shall present corrective measures to the Commissioner within 48 hours of completion of that stage of erection. Upon completion of steel erection, submit the complete package of steel surveys for record to the Design Professionals and the Commissioner.

B. Submittal Process

1. Submittal of shop and erection drawings and other submittals by the Contractor shall constitute Contractor's representation that the Contractor has verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each drawing with other Drawings and other trades. The Contractor shall place their shop drawing stamp on all submittals confirming the above.
2. **Connection design calculations:** Calculations are required for all details that are not indicated on the Drawings as "Completely Designed." The Contractor shall submit connection design calculations and receive an action of approval prior to submitting shop drawings related to those calculations. The shop drawings shall incorporate all comments provided on the calculations.
3. **Shop and erection drawings:** Submit in complete packages so that individual parts and the assembled unit may be reviewed together. This Specification Section and the applicable drawings used in the development of the shop and erection drawings shall be referenced on

each shop and erection drawing to facilitate checking. Unless the piece marks are self-indexing, furnish index sheets with the shop drawings, relating piece marks for all beam, girder and column details to the sheet numbers on which they are located.

4. The Contractor shall submit to the Commissioner one (1) electronic copy for shop drawing review. If the Contractor and Design Team agree to process shop drawings electronically, Contractor shall submit one hardcopy and one electronic copy to the SER. The naming convention of each drawing must follow the submittal numbering system and include the submittal #, specification #, revision # and drawing # in the prefix of the drawing name.
5. The Contractor shall allow at least ten (10) working days between receipt and release by the SER for the review of shop and erection drawings and submittals other than connection design calculations. The Contractor shall allow at least fifteen (15) working days between receipt and release by the SER for the review of connection design calculations.
6. All modifications or revisions to submittals, shop drawings, connection design calculations and erection drawings must be clouded, with an appropriate revision number clearly indicated. The following shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Commissioner:
 - a) Failure to specifically cloud modifications
 - b) Failure to submit calculations for the modifications
 - c) Unapproved revisions to previous submittals
 - d) Unapproved departure from Contract Documents
7. The Contractor shall deliver to the Commissioner at the completion of the job two (2) electronic versions of the final as-built shop drawings on a CD-ROM or other media acceptable to the Commissioner.
8. Resubmittals: Completely address previous comments prior to resubmitting a drawing. Resubmit only those drawings that require resubmittal.

C. SER Submittal Review

1. The review of connection design and the review and approval of shop and erection drawings and other submittals by the Commissioner shall be for general conformance with the design intent of the work and with the information given in the Contract Documents only and will not in any way relieve the Contractor or the Contractor's Engineer from:
 - a) Responsibility for the adequacy of the design of the connections designed by the Contractor's Engineer.
 - b) Responsibility for all required detailing.
 - c) Responsibility for the proper fitting of construction work in strict conformance with the contract requirements.
 - d) The necessity of furnishing material and workmanship required by contract Drawings and Specifications which may not be indicated on the shop and erection drawings.
 - e) Conforming to the Contract Documents.
 - f) Coordination with other trades.
 - g) Control or charge of construction means, methods, techniques, sequences or procedures, for safety precautions and programs in connection with the work.
2. TYPE 1 Stamp - For shop drawings for building elements designed by the SER, the responses on the shop drawing review stamp used by the SER require the following actions:
 - a) APPROVED indicates that the SER has found that the information presented on the shop or erection drawing appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b) APPROVED AS NOTED indicates that the SER requires the shop or erection drawing to be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected shop or erection drawing for record.

- c) REVISE and RESUBMIT indicates that the SER requires resubmission of the shop or erection drawing after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
 - d) NOT APPROVED indicates that the shop or erection drawing does not conform to the Contract Documents and must be extensively revised before re-submittal. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
3. TYPE 2 Stamp - For submittals for building elements which are not designed by the SER but are performance specified, for items that do not form part of the completed structural system but impose loads on the structure, and for construction items or activities which have an effect on the final structure, a second stamp will be used. The responses on the stamp used by the SER require the following actions:
- a) NO EXCEPTIONS indicates that the SER has found that the information presented on the submittal appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b) EXCEPTIONS NOTED indicates that the SER requires the submittal be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected document for record.
 - c) REJECTED indicates that the SER requires resubmission of the submittal after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed. Contractor to revise and resubmit until SER response of No Exceptions or Exceptions Noted is received.
- D. Substitution Request
- 1. Requests for any departure from Contract Documents must be submitted in writing by the Contractor and accepted in writing by the Commissioner, prior to receipt of submittals.
 - 2. All substitutions must be requested using the structural substitution request form included at the end of this section. Acceptance using the structural substitution request form indicates acceptability of the structural concept only. Contractor must submit shop drawings reflecting accepted substitutions for review in accordance with this Specification. The structural substitution request form, even if accepted, does not constitute a change order.
 - 3. Such substitutions or modifications, if acceptable to the Commissioner shall be coordinated and incorporated in the work at the sole expense of the Contractor.
 - 4. The acceptance by the Commissioner of a specific and isolated request by the contractor to deviate from these requirements does not constitute a waiving of that requirement for other elements of, or locations in the project, unless specifically addressed as such and permitted by the Commissioner in writing.
 - 5. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated for the review and/or incorporation of the Contractor-requested substitution, including indirect effects on other portions of the work, the Contractor is responsible for paying for additional work performed by the Design Professionals at the standard billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Commissioner shall also be compensated by the Contractor.
 - 6. Contractor is responsible for means and methods and any impacts on other portions of the work that may arise from this substitution.
- E. Request for Information (RFI)

1. RFI shall originate with the Contractor. RFI submitted by entities other than that Contractor will be returned with no response.
2. Limit RFI to one subject.
3. Submit RFI immediately upon discovery of the need for interpretation or clarification of the Contract Documents. Submit RFI within timeframe so as not to delay the Construction Schedule while allowing the full response time described below.
4. The response time for answering an RFI depends on the category in which it is assigned.
 - a) Upon receipt by the SER, each RFI will be assigned to one of the following categories:
 - i. No cost clarification
 - ii. Shown in Contract Documents
 - iii. Change to be issued in future bulletin
 - iv. Previously answered
 - v. Information needs to be provided by others.
 - vi. Request for corrective field work
 - vii. Request for substitution
 - b) RFIs in categories 1, 2, 3, 4 and 5 will be turned around by the SER on average of five (5) working days.
 - c) RFIs in categories 6 and 7 will be rejected and must be submitted as submittals or requests for substitution.

1.06 TEMPORARY SUPPORT OF STRUCTURAL STEEL FRAME

- A. The structure as shown on the Contract Documents is designed to withstand the design loads only when all structural elements are installed and fully connected. The contractor shall be responsible for the analysis of all components and assemblies for stresses and displacements that may be imposed by fabrication, shipping, handling, erection, temporary conditions, construction loads, etc. The analysis of such shall be performed by the Contractor's Engineer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Unload all structural steel promptly upon arrival and store in an area designated and approved by the Commissioner at the site of the work. The Contractor shall be responsible for any charges from failure to unload material promptly.
- B. Storage: Store structural steel to drain properly. Provide weep holes and clean out as required to keep steel free from water. Provide adequate protection and shoring to prevent distortion and other damage. Store structural steel on timber; do not lay on mud, directly on ground or cinders, or otherwise handle in a manner that damages finishes. Stored sections shall be readily accessible for inspection.
- C. Store fasteners in a protected place.
- D. Welding materials to be in moisture resistant, undamaged package. Maintain packages effectively sealed until electrode is required for use. Storage and handling shall be per AWS D1.1.

1.08 CONNECTION DESIGN AND DETAILING CONFERENCE

- A. At least 20 working days prior to starting connection design and detailing, the Fabricator shall hold a meeting to verify all connection design assumptions and procedures and shop drawing preparation and submittal procedures.
- B. The Contractor shall prepare an agenda and require responsible representatives of every party who is concerned with the connection design and detailing to attend this meeting, including but not limited to:
 1. Contractor
 2. Fabricator
 3. Detailer

4. Connection Engineer
 5. Design Professionals
 6. Erector
 7. Commissioner
- C. The Fabricator shall prepare an agenda prior to the meeting, and shall distribute meeting minutes to all parties within 5 working days of the meeting.

1.09 DESIGN OF CONNECTIONS

- A. The contractor is responsible to design all connections not completely designed on the Contract Documents. A Completely Designed connection is only one that is specifically designated as such by the statement "COMPLETELY DESIGNED" on the Contract Documents. All connections not indicated as "COMPLETELY DESIGNED" shall be designed for the forces and/or connection design criteria called for in the Contract Documents.
- B. Connection concepts shown on the Drawings that are not "COMPLETELY DESIGNED" show only the minimum requirements to convey design intent.
- C. All connections and details shown on shop and erection drawings shall be prepared under the supervision of the Contractor's Engineer, in accordance with AISC "Load and Resistance Factor Design Specification for Structural Steel Buildings."
- D. The contractor shall design and provide any stiffener plates, doubler plates, reinforcing plates, etc. and their connections that may be required to develop and/or transfer the forces and/or connection design criteria called for in the Contract Documents.
- E. Design connections to withstand the combined effects of shears, axial forces, moments and torques and as required by applicable code(s) and the Contract Documents.
- F. All forces shown on the Drawings are to be assumed reversible unless noted otherwise and must be checked for both directions. If no transfer/pass-through forces are shown on the Contract Documents, the most critical combinations of member forces and directions shall be assumed for the connection design.
- G. Use types of shop and field connections shown on Contract Documents or, in absence of such indication, propose appropriate type for Commissioner review.
- H. Welding of High Restraint Welds: Use double bevels in lieu of single bevels where practical. Detail joints to allow for weld shrinkage. In cases of plates in more than one plane, show welding operation sequence on the drawings. In general, start welding at the most restrained part of the weldment and proceed to the least restrained.
- I. All welded connection must utilize pre-qualified joints or joints that have been qualified by AWS D1.1, section 2.
- J. Comply with all connection notes on Drawings in conjunction with these Specifications.
- K. The connection design calculation submittals shall meet the following criteria:
 1. Number each calculation in a logical and orderly system. Once submitted for review, calculations shall not be renumbered. Resubmitted calculations shall be indicated by using the same number with an "R" suffix. All changes must be clouded.
 2. Provide sketches for results of each calculation, with all pertinent dimensions relating to the calculations (including pitch, gage, edge distance, unbraced lengths, Whitmore lengths, etc.) clearly shown. Geometry must be shown accurately and to scale. Provide enough sketches to clearly document the full range of geometric conditions applicable to each connection design calculation proposed.
 3. For repetitive connections provide a spreadsheet or computer program summary table for each specific location, and a standard calculation which shows how the spreadsheet or program calculation applies.

4. Provide drawings showing the overall locations of the connections that are keyed/referenced to each connection calculation.
5. Calculations shall be typed, or performed by spreadsheet, or by computer program, or by other method approved by the SER. All spreadsheet calculations shall show the input and results for every calculation step and include appropriate text and sketches explaining all calculation assumptions.
6. Provide calculation checks for all forces shown on the Drawings. All AISC code requirements apply. Provide calculations for each check. "OK by inspection" is not permitted.

1.10 STRUCTURAL STEEL PRE-ERECTION CONFERENCE

- A. At least twenty (20) working days prior to the commencing of steel erection the Contractor shall hold a meeting to review the detailed requirements of the steel erection.
- B. The Contractor shall prepare an agenda and require responsible representatives of every party who is concerned with the steel erection to attend the conference, including but not limited to the following:
 1. Contractor/Construction Manager
 2. Steel Erector / Steel Fabricator
 3. Erector's Surveyor
 4. Roof Deck Contractor
 5. All Testing and Inspection Agencies
 6. Design Professionals
 7. Commissioner
 8. Precast or Cladding Contractor as appropriate.
- C. Minutes of the meeting shall be recorded, typed and distributed by the Contractor to all parties listed above within 5 working days of the meeting.
- D. The minutes shall include a detailed outline of the erection procedure including a schedule of milestone dates for surveys and sign-offs on erection stages which represents an agreement reached by all parties involved. It shall also include the surveying program and submission schedule for approval.
- E. Notwithstanding any provision of the Specification, the SER shall not be responsible for and not have charge over any safety programs or precautions at the site of the Project.

1.11 QUALITY ASSURANCE BY COMMISSIONER'S TESTING AGENCY

- A. Quality assurance is testing and inspection to assist the Commissioner in evaluating the Contractor's performance in the fabrication shop and field. It is not a substitute for the testing and inspection which is required as part of the Contractor's quality control program (see the following section on quality control).
- B. Cost: Except as specifically noted otherwise, the testing agencies for Special Inspection shall be engaged and paid by the City of New York.
- C. Coordination with Commissioner's Testing Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are provided. The Contractor shall cooperate fully with the Commissioner's testing agencies in the performance of their work and shall provide the following:
 1. Information as to time and place of starting shop fabrication and a field construction and erection schedule, one week prior to the beginning of the work.
 2. Site File: At least one copy of each approved shop drawing shall be kept available in the contractor's field office and the drawings not bearing evidence of approval and release for construction by the Commissioner shall not be kept on the job. Provide drawings for the work to be performed in the shop or field one week prior to the start of work.

3. Representative sample pieces requested by the inspection agency for testing, if necessary.
4. Full and ample means of assistance for testing and inspection of material.
5. Proper facilities, including scaffolding, temporary work platforms, safety equipment etc., for inspection of the work in shop and field.

1.12 QUALITY ASSURANCE BY CONTRACTOR

- A. The term Structural Steel Contractor refers to any or all of the following parties, regardless of their contractual relationships: Structural Steel Fabricator, Structural Steel Detailer, Structural Steel Erector and Contractor's Engineer.
- B. Qualification Data: Submit qualification data for the Structural Steel Fabricator ("Fabricator"), Structural Steel Detailer ("Detailer"), Contractor's Engineer(s) and Structural Steel Erector ("Erector").
- C. The Fabricator shall be AISC certified to the Standard for Steel Building Structures (STD) and must submit proof of these qualifications. The Fabricator's qualifications shall be subject to review by the Design Professionals and Commissioner.
- D. The Detailer shall have experience preparing detailed steel shop drawings and CNC downloads for structures of this type and complexity. The detailer's qualifications shall be subject to review by the Design Professionals and Commissioner.
- E. The Contractor's Engineer(s) shall be qualified to perform the type of work required by the project. The Engineer(s) shall be a Licensed Professional Engineer(s) in New York. The Contractor's Engineer(s) shall have experience being in responsible charge of work of this nature. The proposed Engineer(s) shall be subject to approval of Design Professionals and Commissioner.
- F. The Erector shall be an AISC Certified Steel Erector (CSE) and must submit documentation of this qualification.
- G. Welding: Qualify the welding procedures, shop welders, field welders, welding operators and tackers in accordance with AWS D1.1 and for the following periods of effectiveness of certification:
 1. Certification and qualification, including period of effectiveness of welding personnel shall be as specified by AWS D1.1. Certification shall remain in effect for duration of work provided welders are continuously engaged in performing the type of welding for which they are certified, unless welders fail to perform acceptable welding, as determined by the Commissioner's Testing Agency. Certification and re-certification of welding personnel is subject to verification by the Testing Agency. Re-testing for re-certification will be the Contractor's responsibility.

1.13 QUALITY CONTROL BY CONTRACTOR

- A. The Contractor shall provide a program of quality control to ensure that the minimum standards specified herein are attained.
- B. The Contractor shall immediately report to the Commissioner any deficiencies in the work which are departures from the Contract Documents which may occur during construction. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Commissioner. After proposed corrective action is accepted by the Design Professionals and Commissioner, the Contractor shall correct the deficiency at no cost to the City of New York.
- C. The Commissioner's general review during construction and activities of the Commissioner's Testing Agency are undertaken to inform the Commissioner of performance by the Contractor but shall in no way replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.

1.14 OBSERVATIONS AND CORRECTIONS BY COMMISSIONER

- A. Review: The Commissioner will observe the construction for general compliance with the provisions of the Contract Documents during various phases of construction.

1.15 PERMITS AND WARRANTY

- A. Permits: The Contractor shall apply for, procure, renew, maintain, and pay for all permits required by City of New York, State of New York, or other governing authorities, necessary to execute work under this Contract. Contractor shall furnish copies of all permits to the Commissioner and Design Professionals.
- B. Warranty: Upon completion of all work to be performed under this Contract, the Contractor shall execute and deliver in a satisfactory form a warranty that all workmanship and materials used in the performance of this Contract shall remain free from defects for a period of one (1) year from the date of execution of the Warranty.

PART 2 - PRODUCTS

2.01 STRUCTURAL STEEL

- A. Structural steel shall conform to the requirements listed on the Structural General Notes.

2.02 SHOP COATINGS

- A. Standard Primer: Rust inhibitive, universal phenolic alkyd metal primer 2-4mls. Color to be determined by Commissioner. Primer shall be compatible with, and from the same manufacturer as, top coats specified in Division 9 specification.
- B. Zinc Rich Primer: SSPC-Paint 20, Type I or Type II, Zinc rich primer utilizing either an organic or inorganic binder with a minimum zinc content of 80 percent by weight in the dry film. The primer shall provide a surface meeting AISC Slip Critical Class B (slip coefficient = 0.50 min) requirements. Color to be determined by Commissioner. Primer shall be compatible with, and from the same manufacturer as, top coats specified in Division 9 specification.
- C. Hot Dip Galvanizing: ASTM A123, weight of coating shall average not less than 2.3 oz per square foot (0.70 kg/ m²), with no individual thickness less than 2.0 oz per square foot (0.61 kg/m²).
- D. Galvanizing Repair Paint: ZRC Cold Galvanizing Compound, or other coating complying with SSPC-Paint 20.

2.03 ACCESSORIES

- A. High Strength Bolts: Conform to the provisions of the Research Council on Structural Connections (RCSC) "Specifications for Structural Joints using ASTM A325 or A490 Bolts" except that nuts shall be ASTM A563 Grades DH or DH3 (hardened) for both A325 and A490 bolts. Twist off type bolts (Tension Control bolts) shall additionally conform to ASTM F1852 or ASTM F2280.
- B. All bolts shall be new, and not re-used.
- C. Where A325 galvanized bolts nuts and washers are required, they shall be in accordance with ASTM F2329 and ASTM A153, Class C. Where A588 steel is used, bolts, nuts and washers shall be Type 3.
- D. Direct Tension Indicators: Meet requirements of ASTM F959.
- E. Anchor Rods: Per structural General Notes.
- F. Washers:

1. Round washers shall conform to American Standard B 27.2 type b
 2. Washers in contact with high-strength bolt heads and nuts shall be hardened in accordance with ASTM Standard F436.
 3. Beveled washers shall be square, smooth and sloped so that contact surfaces of the bolt head and nut are parallel.
 4. The diameter of the hole of square beveled washers shall be 1/16 inch (1.5mm) greater than the bolt size for bolts smaller than one inch (25mm), and shall be 1/8 inch (3.0mm) greater than the bolt size for bolts larger than one inch (25mm).
 5. Comply with requirements of RCSC for all washers including thickness, size and hardness, depending on connection details.
- G. Welding Electrodes: Electrodes shall be low hydrogen and shall be selected from Table 3.1 of AWS D1.1.
1. Shielded Metal-Arc Welding: Welding electrodes for manual shielded metal-arc welding shall conform to the specification for Mild Steel Covered Arc-Welding Electrodes, AWS A5.1 E70 or 80, or the specification for Low-Alloy Steel Covered Arc-Welding Electrode, AWS A5.5.
 2. Submerged-Arc Welding: Bare electrodes and granular flux used in submerged-arc welding shall conform to F70 or F80 AWS flux classifications of the specification for Mild Steel Electrodes and Fluxes for submerged-arc Welding, AWS A5.17.
- H. Headed Studs (shear connectors) shall be per Structural General Notes.
- I. Deformed Bar Anchors shall be as specified in Structural General Notes.
- J. Steel Castings shall conform to ASTM A27, Grade 65-35, medium strength carbon steel.
- K. Grout: Refer to General Notes.
- L. Post-installed Anchors shall be per Structural General Notes.
- M. Elastomeric bearing pads: Pre-formed bearing pads consisting of Neoprene or synthetic rubber molded with internal stainless steel shims. ASTM D 2240 Shore A hardness of 60 durometer.
1. American Bearing Co., Inc. "Neoprene Bearing Pads."
 2. Balco, Inc. "Neoprene Bearing Pads."
 3. Fluorocarbon/Oil States Bearing Pad Division. "Elastomeric Bearing Pads."
 4. Tobi Engineering, Inc. "Dura-Slide Elastomeric Pads."
 5. or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Work by Others: Examine all work prepared by others to receive work of this Section and report any defects affecting installation to Commissioner. Commencement of work will be construed as complete acceptance of preparatory work by others. The Contractor alone shall be responsible for checking the dimensions and coordination of the structural steel work with other trades.
- B. Anchor Rods: At least 20 working days prior to the start of the structural steel erection, the Contractor shall ascertain by accurate survey the existing location, alignment, and elevation of the anchor rods embedded in the concrete by others. The Contractor shall immediately bring to the attention of the Commissioner any discrepancies observed between the Contract Documents and the as-built conditions. Steel erection shall not start until corrective measures, if required, have been performed.

3.02 FABRICATION

- A. Fabricate and assemble structural steel in the shop to the greatest extent possible.

- B. Tolerances:
1. Conform to the tolerances of the AISC "Code of Standard Practice," compensate for the difference between the temperature at time of fabrication and the mean temperature in service.
 2. Elevator shafts used for temporary hoists shall conform to the detailed requirements of the hoist manufacturer.
- C. Holes: Holes shall be provided in members to permit connections to the work of other trades or contracts, and for passage through the member of work of other trades. All holes shall be accurately drilled or punched at right angles to the surface of the metal in accordance with AISC Specifications. Holes shall not be made or enlarged by burning. Burning or drifting unfair holes will not be permitted. Holes that must be enlarged shall be reamed. Drift pins will be allowed only to bring together the several parts for connection. Holes in base plates shall be drilled. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling operations shall be removed with a suitable tool.
- D. Camber: Provide camber as indicated on the Contract Documents. Where no camber is indicated, provide natural camber up.
- E. Cutting: Manual gas-cutting in the shop may be used only if automatic or semi-automatic methods are not possible. If manual shop cutting is required, it shall be done only with a mechanically guided torch, except that an unguided torch may be used where the cut is more than 1/2 inch (12mm) from the finished dimension and final removal is completed by means such as chipping or grinding to produce a gouge-free surface of quality equal to that of the base metal. At restrained joints and as indicated elsewhere, weld access holes shall be ground smooth.
- F. Cutting of Heavy Shapes: Where "Heavy Shapes" as defined in this Specification are to be joined by partial or full penetration welds in tension, preheating shall be required for all thermal cutting operations. Preheat shall be sufficient to prevent cracking but in no case less than 150 degrees F (65°C). Weld access holes and copes shall be ground to a smooth radius after cutting and tested for cracks by the magnetic particle method. All cut edges shall be free of sharp notches and gouges.
- G. Anchor Rods: Rigid steel templates and anchor rods shall be furnished, labeled and shipped in sets indicating sizes and locations of columns, together with instructions for setting of anchor rods. Plate washers per Typical Details shall be provided.
- H. Bolting: Bolts shall be driven accurately into the holes without damaging the threads. Bolt heads shall be protected from damage during driving. Bolt heads and nuts shall rest squarely against the metal. Where bolts are to be used on beveled surfaces having slopes greater than 1 in 20 with a plane normal to the bolt axis, beveled washers shall be provided to give full bearing under the head or nut.
- I. Bolts indicated as "finger tight" on the Contract Documents shall be prevented from backing off by using lock nuts, thread compound or deformed threads.
- J. Installation of High Strength Bolts:
1. Except where "snug tight" installation is specifically permitted on design Drawings, all high strength bolts shall be installed with full pretension using Turn-of-Nut Pretensioning, Twist-Off Type Tension Control Bolt Pretensioning or Direct-Tension-Indicator (DTI) Pretensioning in accordance with the "Specification for Structural Joints Using ASTM A325 or A490 Bolts". Calibrated Wrench Pretensioning shall only be used where specifically approved by the SER.
 2. Comply with special washer requirements of the RCSC, such as those related to slotted and oversize holes, and tapered flanges. DTI "washers" shall not be substituted for such required washers.
 3. All high strength bolt assemblies (including Tension Control bolts and DTI's) used in pretensioned connections shall be verified in accordance with the Pre-Installation Verification section of the RCSC.
 4. Clean and re-lubricate bolts and nuts that become dry or rusty before use, except Tension Control bolts must be re-lubricated by manufacturer.
- K. Welding of Structural Steel:

1. Pre-Weld Inspection: The surface to be welded and the filler material to be used shall be subject to inspection before welding is performed.
 2. Welds indicated on the Contract Documents or the approved shop or erection drawings shall be created by electric arc welding processes that comply in all respects with the codes and specifications herein noted covering the design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors. Control the heat input, weld length, weld sequence and cooling process to prevent distortion of the completed assembly.
 3. Each welder's work shall be traceable.
 4. Special Requirements: For high restraint welds and welds at heavy shapes, follow approved welding procedures for weld process, sequence, pre-heating and cooling. Use stress relieving techniques where shown in the approved procedure developed by the Contractor's Welding Consultant.
 - a) Special Procedures: Prior to the start of production welding, the contractor shall demonstrate to the Testing Agency that preheat can be maintained without relying on heat from the arc. For field welding, the contractor shall provide a shelter to protect each joint from inclement weather (rain, snow, etc.), from start until completion of the joint.
 - b) Preheat and Postheat: Preheat shall be sufficient to prevent cracking, but in no case less than required by AWS D1.1. For high-restraint welds, minimum preheat shall be 225 degrees F (105°C). The preheat shall be maintained throughout the thickness of the material for a distance equal to twice the material thickness on both sides of the joint at a minimum. Where different thicknesses of steel are being joined, the greater thickness shall govern. Preheat shall be measured on the face opposite the side of the heat application. Preheat shall be applied uniformly in a manner that does not harm the surface of the material nor cause surface temperatures to exceed 1100 degrees F (600°C). Should stress relief heat treatment be required, the contractor shall submit a written procedure.
 - c) Prior to heat treatment on a production weld, prepare and treat a test sample per the contractor's written procedure for tensile tests in accordance with ASTM requirements.
 5. Deficient Welds: Welds found deficient in dimensions but not in quality may be enlarged by additional welding. Any weld found deficient in quality shall be removed by grinding or melting and the weld shall be remade.
- L. Bearing:
1. Bearing ends of columns shall be milled or sawn square perpendicular to axis of the column.
 2. Finish bearing areas of base plates per AISC M2.8.
- M. Stiffeners: Fitted stiffeners shall be ground to fit closely against flanges.
- N. Cleaning and Preparation of Steel Surfaces:
1. Clean all steel work in accordance with the Society for Protective Coatings (SSPC) Method specified herein that corresponds to its location and exposure. Steel work to be painted shall be painted within the same day that it is cleaned.
 - a) Interior, Not Exposed to View (above suspended ceilings, under sprayed-on fireproofing, steel to be encased in concrete): SSPC-SP-2, Hand Tool Cleaning.
 - b) Interior, Exposed in the Finished Building: SSPC-SP-6, Commercial Blast Cleaning, unless noted otherwise on the Drawings.
 - c) Exterior (exposed to weather or in unconditioned space): SSPC-SP-6, Commercial Blast Cleaning, unless noted otherwise on the Drawings.
 - d) Architecturally Exposed Structural Steel where indicated on the Contract Documents as "AESS": SSPC-SP-10, Near White Blast.
 - e) Members to be Hot Dipped Galvanized: SSPC-SP3, Power Tool Cleaning, before galvanizing.
- O. Shop Coating:

1. Where painting is specified, paint all steel work in accordance with the Society for Protective Coatings (SSPC) Method specified herein that corresponds to its location and exposure and in accordance with manufacturer's written instructions. Paint steel work the same day that it is cleaned.
 - a) Interior, Not Exposed to View (above suspended ceilings, under sprayed-on fireproofing, steel to be encased in concrete): No Paint.
 - b) Interior, Exposed in the Finished Building: SSPC - Paint 25
 - c) Exterior (exposed to weather or in unconditioned space): SSPC - Paint 20
2. Protect finished bearing surfaces with a rust-inhibiting coating which is to be removed immediately prior to erection.
3. Do not paint:
 - a) Surfaces within six (6) inches (150mm) of field welds
 - b) Surfaces to be encased in concrete or to receive cementitious fireproofing
 - c) Contact surfaces of high-strength bolted Slip Critical connections (unless surface prep and paint has been specifically prequalified by the contractor or approved for use in this location by the SER)
 - d) Surfaces required for testing and preheat, until all testing and preheat has been performed
 - e) Finished bearing surfaces (use removable rust-inhibiting coating)
 - f) Top flange of the beam where steel deck or headed studs are to be attached
4. Paint shall be applied thoroughly and evenly to dry surfaces only when surface temperatures are above dew-point, in strict accordance with manufacturer's instructions.
5. Surfaces of exterior members which are inaccessible after assembly or erection shall receive their second coat of the approved paint, in a different shade, in the shop.
6. Hot-dip galvanize the following steel members:
 - a) All angles, steel plates and shims supporting exterior masonry or exposed to the weather, including shelf, arch and relieving angles
 - b) All connections between the above angles and steel plates and the supporting structural member, including clip angles and hardware
 - c) Any other steel members indicated as "Galvanized" on the Contract Documents.
 - d) All miscellaneous metal, angles, clips, etc. on exterior masonry walls.

3.03 ERECTION

- A. Tolerances: Erect all work plumb, square and true to lines and levels in strict accordance with the structural requirements of the building within tolerances of the AISC Code of Standard Practice, unless otherwise indicated on the Contract Documents. Compensate for the difference between the temperature at time of erection and the mean temperature in service.
- B. Bracing: Brace the frame during erection in accordance with the Contractor's erection procedure.
- C. Errors: Immediately report to the Commissioner any errors in shop fabrication, deformations resulting from handling and transportation, and improper erection that affects the assembly and fitting of parts. Prepare details for corrective work and obtain approval of the method of correction. Approved corrections shall be made expeditiously at the sole expense of the Contractor.
- D. Column Base Plates: Support and align on steel shims or setting bolts. After the supported members have been plumbed and properly positioned, tighten anchor rod nuts in preparation for grouting. Cut off wedges and shims flush with edges of plates and leave in place. The use of leveling plates will not be permitted.
- E. Grouting: Refer to General Notes. Grout base plates immediately after the first tier of columns are plumbed. Do not proceed with steel erection above the first tier until base plates are grouted.
- F. Bolting and Welding of Structural Steel: See Section on "Fabrication".

- G. Bearing Surface: Clean bearing surfaces and surfaces that will be in permanent contact before the members are assembled.
- H. Splices: Splices will be permitted only where indicated on the Contract Drawings or the reviewed shop drawings. Fasten splices of compression members only after surfaces are cleaned and abutting surfaces have been brought completely into contact. Fill any remaining gaps with steel shims driven into place and cut flush. Tack weld shims to each other and to members. Use runoff tabs at bevel weld splices. Cut off runoff tabs and ground smooth after weld completion.
- I. Driftpins: Driftpins may be used only to bring together the several parts, and shall not be used in such a manner as to distort or damage the metal. Correct poor matching of holes by drilling to the next larger size and using a larger size bolt. Plug welding and redrilling will not be permitted, unless a specific instance arises and is approved by the SER.
- J. Erection bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces. On non-exposed welded construction, remove erection bolts.
- K. Hammering: Hammering which may damage or distort the members will not be permitted.
- L. Do not use cutting torches in the field without the specific approval of the SER for each application. Where cutting torch use is permitted, all the requirements of the Section on "Fabrication" shall apply.
- M. Additional Material and Labor: If the Contractor furnishes additional material and labor for the purpose of erection or if the erection method requires that material be added to certain members, the required modifications shall be at the sole expense of the Contractor.
- N. Alignment: Following erection, accurately align, level, and adjust all members prior to final fastening. Conform to AISC standard tolerances unless otherwise noted in the Contract Documents.
- O. Touch-Up and Field Applied Paint: After erection, clean all damaged areas in the shop coat, exposed surfaces of bolts, bolt heads, nuts and washers and all field welds and unpainted areas adjacent to field welds according to manufacturer's recommendations and paint with the same paint used for the shop coat. Match the touch up and field applied paint color to the as-built paint color. After touch up, at exterior (exposed to the weather or in unconditioned space) steel members apply a full coat of the specified paint in a different shade than the shop applied coat.
- P. After erection, clean all damaged galvanized areas, welds and areas adjacent to welds and paint with the specified galvanizing repair paint.
- Q. Clean all steel members of mud and debris and construction residue prior to erection.
- R. Headed Studs and Deformed Bar Anchors:
 - 1. End weld headed studs and deformed bar anchors with an automatic process in accordance with section 7 of AWS D1.1.
 - 2. Areas to which studs are to be attached must be free of foreign material, such as rust, oil, grease, paint etc. When mill scale is sufficiently thick to cause difficulty in obtaining proper welds, remove by grinding or sand blasting.
 - 3. Remove ceramic ferrules from studs and work after welding.

END OF SECTION

SECTION 05 4000 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Formed steel stud exterior wall and interior wall framing.
- B. Exterior wall sheathing.
- C. Formed steel joist and purlin framing and bridging.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.
- B. Section 07 2100 - Thermal Insulation: Insulation within framing members.
- C. Section 07 2500 - Weather Barriers: Weather barrier over sheathing.
- D. Section 07 6200 - Sheet Metal Flashing and Trim: Head and sill flashings.
- E. Section 07 9200 - Joint Sealants.
- F. Section 09 2116 - Gypsum Board Assemblies: Lightweight, non-load bearing metal stud framing.
- G. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.
- H. Section 09 2236.23 - Metal Lath.
- I. Section 09 2400 - Portland Cement Plastering.

1.04 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

- D. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.
- F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- G. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.06 QUALITY ASSURANCE

- A. Engineer Qualifications: Provide framing system under direct supervision of a Professional Structural Engineer experienced in provision of this Work and licensed in New York.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. CEMCO: www.cemcosteel.com.
 - 2. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 3. Marino: www.marinoware.com.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and Depth: As required to meet specified performance levels.
- B. Joists and Purlins: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.

2.04 WALL SHEATHING

- A. Wall Sheathing, GWB-6: Glass mat faced gypsum; ASTM C1177/C1177M, square long edges, 5/8 inch Type X fire resistant.

2.05 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

PART 3 EXECUTION

3.01 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- D. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- E. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- F. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- G. Install intermediate studs above and below openings to align with wall stud spacing.
- H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged galvanized surfaces with primer.

3.02 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Place joists at 16 inches on center; not more than 2 inches from abutting walls. Connect joists to supports using fastener method.
- D. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- E. Touch-up field welds and damaged galvanized surfaces with primer.

3.03 WALL SHEATHING

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.

END OF SECTION

SECTION 05 5000 - METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Prefabricated ladders and ship ladders.
- C. Steel Pipe Bollards.

1.03 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 05 5213 - Pipe and Tube Railings.
- D. Section 09 9000 - Painting and Coating

1.04 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- F. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- G. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric); 2013.

- H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.
- L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
- M. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- N. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
- O. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

- E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
- F. Slotted Channel Fittings: ASTM A1011/A1011M.
- G. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, plain.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
 - 1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
 - 2. Rungs: one inch diameter solid round bar spaced 12 inches on center.
 - 3. Space rungs 7 inches from wall surface.
- B. Bumper Posts and Guard Rails: As detailed; prime paint finish.
- C. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- D. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of masonry; prime paint finish.
- E. Lintels: As detailed; prime paint finish.
- F. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish.
- G. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.
- H. Toilet Partition Suspension Members: Steel channel sections; prime paint finish.

2.04 PREFABRICATED LADDERS

- A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
1. Components: Manufacturer's standard rails, rungs, treads, handrails, returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
 2. Materials: Aluminum; ASTM B221 (ASTM B221M), 6063 alloy, T52 temper.
 3. Finish: Manufacturer's standard hot-dipped galvanizing; comply with ASTM A153/A153M.

2.05 FINISHES - STEEL

- A. Prime paint steel items.
1. Exceptions: Galvanize items to be embedded in concrete and items to be imbedded in masonry.
 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 2.0 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.
- D. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

SECTION 05 5213 - PIPE AND TUBE RAILINGS

PART 1. GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Free-standing railings at steps.
- D. Balcony railings and guardrails.

1.03 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 04 2000 - Unit Masonry: Placement of anchors in masonry.
- C. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- D. Section 09 9000 - Painting and Coating: Paint Finish

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- D. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- E. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- F. SSPC-Paint 15 - Steel Joist Shop Paint; 1999 (Ed. 2004).

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches diameter, round.
 - 3. Posts: 1-1/2 inches diameter, round.
 - 4. Balusters: 1/2 inch square solid bar.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
 - 3. For anchorage to stud walls, provide backing plates, for bolting anchors.
 - 4. Posts: Provide adjustable flanged brackets.
- G. Provide mechanical and welding fittings where indicated to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

- A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.

- B. Steel Pipe: ASTM A53/A53M, Grade B Schedule 80, black finish.
- C. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
- D. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- E. Exposed Fasteners: No exposed bolts or screws.
- F. Straight Splice Connectors: Steel concealed spigots.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
 - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5306 - METAL GRATINGS AND FLOOR PLATES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.02 SUMMARY

- A. The Work of this Section shall include, but not be limited to, the following:
 - 1. Formed metal floor gratings. Perimeter closure..

1.03 QUALITY ASSURANCE

- A. Contractor's Engineer Qualifications: Provide gratings and plates under direct supervision of a New York State Licensed Professional Engineer experienced in design of this type of work.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.04 REFERENCES

- A. Comply with applicable provisions of the following reference standards except as otherwise shown or specified.
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
 - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
 - 3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
 - 4. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012e1.
 - 5. ASTM B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric); 2012e1.
 - 6. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
 - 7. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.
 - 8. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide span and deflection tables.
- D. Shop Drawings: Indicate details of component supports, openings, perimeter construction details, and tolerances.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- E. Engineering Service Submittal: For gratings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Manufacturer's Installation Instructions: Indicate special requirements for opening and perimeter framing.
- G. Welding certificates.

1.06 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 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. All American Grating: www.allamericangrating.com.
 - 2. Borden Metal Products (Canada) Limited: www.bordengratings.com.
 - 3. Ohio Gratings, Inc: www.ohiogratings.com.
 - 4. Approved equal.

2.02 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for loading requirements.

- B. Maximum Allowable Deflection Under Live Load: 1/240 of span; size components by single support design.
- C. Maximum Spacing Between Bars: To restrict pedestrian shoe heels.

2.03 MATERIALS

- A. Steel Framing: ASTM A36/A36M shapes, galvanized per ASTM A123/A123M.
- B. Cross Bars: ASTM B211 (ASTM B211M) solid bars.
- C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.04 METAL BAR GRATINGS

- A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual" and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."
- B. Welded Steel Grating:
 - 1. Bearing Bar Spacing: As required to meet structural performance requirements.
 - 2. Bearing Bar Depth: As required to comply with structural performance requirements.
 - 3. Bearing Bar Thickness: As required to comply with structural performance requirements.
 - 4. Crossbar Spacing: 2 inches o.c.
 - 5. Traffic Surface: Serrated.
 - 6. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.

2.05 ACCESSORIES

- A. Fasteners and Saddle Clips: Galvanized steel:
- B. Perimeter Closure: Of same material as grating.

2.06 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563 and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

- D. Post-Installed Anchors: Torque-controlled expansion or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.07 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.08 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Welding: Comply with AWS recommendations and 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.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
 - 1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
 - 2. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.
- G. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
 - 1. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
 - 2. Furnish threaded bolts with nuts and washers for securing grating to supports.

- H. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
 - 1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
- I. Do not notch bearing bars at supports to maintain elevation.

2.09 GRATING FRAMES AND SUPPORTS

- A. Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
 - 1. Unless otherwise indicated, fabricate from same basic metal as gratings.
 - 2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.
- B. Galvanize steel frames and supports.

2.10 FINISHES

- A. Prepare surfaces to be primed in accordance with SSPC-SP 1.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Do not prime surfaces in direct contact with concrete or where field welding is required.
- D. Prime paint items with one coat.
- E. Galvanizing for Steel Shapes: ASTM A123/A123M.
- F. Galvanizing for Steel Hardware: ASTM A153/A153M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify that opening sizes and dimensional tolerances are acceptable.
- C. Verify that supports are correctly positioned.

3.02 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Attach toeplates to gratings by welding.
- F. Field Welding: Comply with AWS recommendations and 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.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.03 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.04 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.02 SECTION INCLUDES

- A. Rough opening framing for doors, windows, and roof openings.
- B. Subflooring.
- C. Roof-mounted curbs.
- D. Roofing nailers.
- E. Roofing cant strips.
- F. Preservative treated wood materials.
- G. Fire retardant treated wood materials.
- H. Miscellaneous framing.
- I. Communications and electrical room mounting boards.
- J. Concealed wood blocking, nailers, and supports.

1.03 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings.
- C. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.04 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- C. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.

- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- E. AWPA U1 - Use Category System; User Specification for Treated Wood; American Wood Protection Association; 2012.
- F. PS 1 - Structural Plywood; 2009.
- G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, U.S. Department of Commerce; 2010.
- H. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.
- I. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.
- J. Prohibited Carcinogenic Compounds (Pressure-Treated Wood): International Agency for Research on Cancer (IARC), Lyon, France, www.iarc.fr/

1.05 SUBMITTALS

- A. See DDC Genreal Conditions, for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide technical data on wood preservative materials and application instructions.
- D. Manufacturer's certification of product compliance with pressure-treated wood criteria per section 2.01 of this specification.
- E. Adhesives: For each adhesive used, documentation indicating that the adhesive contains no added urea formaldehyde.
- F. Material Safety Data Sheets.
- G. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- H. 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 ALSC Board of Review.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.07 WARRANTY

- A. See DDC General Conditions, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ENVIRONMENTALLY-PREFERABLE PRODUCT CRITERIA:

- A. For lumber that is required by code and/or by application to resist damage and decay due to exposure to moisture, the following material options are recommended, to the extent feasible:
 - 1. Pressure-Treated Lumber without Carcinogenic Agents:
 - a. Pressure-treated wood products shall not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. In addition, pressure-treated wood products shall not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and shall not be classified as hazardous waste.
 - b. Non-compliant products include, but are not limited to, Chromated Copper Arsenate (CCA) treatments, Ammoniacal Copper Zinc Arsenate (ACZA) treatments, and those using pentachlorophenol or creosote. Compliant pressure preservative treatments include, but are not limited to, Ammoniacal Copper Quaternary (ACQ), and Copper Boron Azole (CBA).

2.02 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.
- C. Urea Formaldehyde: not permitted.
 - 1. Composite Wood products may not contain added urea formaldehyde.
- D. VOC Content: Comply with the restrictions on Volatile Organic Compound content as follows:
 - 1. Comply with the restrictions on VOC content per NYC EPP Minimum Standards for Construction Products, 2012
 - 2. Wood Preservatives: a maximum concentration of volatile organic compounds of 350 grams per liter.
 - 3. Wood Sub-Floor Adhesive: a maximum concentration of volatile organic compounds of 50 grams per liter.
 - 4. Structural Wood Member Adhesive: a maximum concentration of volatile organic compounds of 140 grams per liter.
 - 5. Wood Substrate Applications: a maximum concentration of volatile organic compounds of 30 grams per liter.

2.03 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.04 CONSTRUCTION PANELS

- A. Subflooring: Any PS 2 type, rated Sheathing.
 - 1. Bond Classification: Exterior.
 - 2. Span Rating: 48.
 - 3. Performance Category: 3/4 PERF CAT.
- B. Wall Sheathing: Closed Cell Polyisocyanurate foam core bonded to a premium performance coated glass facer on one side and 5/8 inch or 3/4 inch fire treated plywood on the other; comply with ASTM C1289, Type V. See Section 07 2160 for complete specification.
 - 1. Manufacturers:
 - a. Hunter Panels, LLC; Xci Ply: www.hunterxci.com.
 - b. Atlas Roofing; AC Foam Nailbase: www.atlasroofing.com
 - c. GAF Cornell; Thermacal Non-Ventilated; www.cornellcorporation.com
 - d. or approved equal.
- C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- D. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.

2.05 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Anchors: Bolt or ballistic fastener for anchorages to steel.
 - 4. Nails, Brads, and Staples: ASTM F 1667.
 - 5. Power-Driven Fasteners: NES NER-272.
 - 6. Wood Screws: ASME B18.6.1.
 - 7. Lag Bolts: ASME B18.2.1

- 8. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- B. Sill Flashing: As specified in Section 07 6200.
- C. Subfloor Glue: APA AFG-01, Waterproof, water base, air cure type, cartridge dispensed.
- D. Water-Resistive Barrier: As specified in Section 07 2505.
- E. Metal Framing Anchors:
 - 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. Cleveland Steel Specialty Co.
 - b. KC Metals Products, Inc.
 - c. Phoenix Metal Products, Inc.
 - d. Simpson Strong-Tie Co., Inc.
 - e. USP Structural Connectors.
 - 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those [indicated] [of basis-of-design products] [of products of manufacturers listed]. 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.
 - 3. Joist Hangers: U-shaped joist hangers with minimum 2-inch- (50-mm-) long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth. Minimum thickness: 0.050 inch. Shall provide capacity indicated on structural drawings.
 - 4. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member. Shall provide capacity indicated on structural drawings
 - a. Minimum Strap Width: 1-1/2 inches
 - b. Minimum Thickness: 0.050 inch
 - 5. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.
 - 6. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
 - 7. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - a. Minimum Width: 1-1/4 inches
 - b. Minimum Thickness: 0.050 inch
 - c. Minimum Length: 24 inches.
 - 8. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- F. Building Paper: Water resistant Kraft paper.

2.06 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:
 1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Do not use treated wood in direct contact with the ground.
 2. Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
 1. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.

3.03 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring: Glue and nail to framing; staples are not permitted.
- B. Underlayment: Secure to subflooring with nails and glue.
 - 1. Place building paper between floor underlayment and subflooring.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.05 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.07 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 4200 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. This Section includes the following:
 - 1. WD-3: Flush wood paneling; Birch Veneer, Fir Core.
 - 2. WD-2, WD-4: Interior standing and running trim; Opaque Finish.
 - 3. WD-5: Solid-Wood countertops; Birch, Edge Grain Butcher Block, Clear Finish.
 - 4. WD-6: Flush wood paneling; Birch Veneer, Fire-Resistant-Treated Core.
 - 5. WD-7: Interior standing and running trim; Clear Finish.
 - 6. Custom wood cabinets.

1.03 RELATED REQUIREMENTS:

- A. Section 06 1000 - Rough Carpentry for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
- B. Section 09 9000 - Painting and Coating
- C. Section 08 7100 - DOOR HARDWARE for hardware not included in this section.

1.04 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2009.
- C. ANSI/AHA 132.4 - Basic Hardboard.
- D. ANSI/BHMA A156.9 - Cabinet Hardware.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- F. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- G. AWI/AWMAC/WI [AWS] - Architectural Woodwork Standards; 2009.
- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009 [ANSI/HPVA HP-1].

- I. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittals procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: For each type of product indicated, including cabinet hardware and accessories.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- D. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
 - 4. Wood Panels: Shop drawings to be produced prior to fabrication for Commissioner's review and approval.
- E. Samples for Verification:
 - 1. Veneer-faced panel products with or for transparent finish, 24 by 24 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
 - 2. Solid-Wood countertop materials, 12 inches square.
 - 3. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 - 4. Exposed cabinet hardware and accessories, one unit for each type and finish.
- F. Adhesives: For each adhesive used, documentation indicating that the adhesive contains no urea formaldehyde.
- G. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.07 QUALITY ASSURANCE

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork.

- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
- C. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- D. Mockups: Build mockups, as shown on Drawings, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Mockups to show full range of material finish for aesthetic workmanship quality.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" paragraph.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section "Door Hardware" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 - 3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
- C. Urea Formaldehyde: not permitted.
 - 1. Composite Wood products may not contain added urea formaldehyde.
- D. VOC Content: Comply with the restrictions on Volatile Organic Compound content as follows:
 - 1. Comply with the restrictions on VOC content per NYC EPP Minimum Standards for Construction Products, 2012
 - 2. Wood Preservatives: a maximum concentration of volatile organic compounds of 350 grams per liter.
 - 3. Wood Substrate Adhesives: a maximum concentration of volatile organic compounds of 30 grams per liter.
 - 4. Clear Wood Coating - Varnishes: a maximum concentration of volatile organic compounds of 275 grams per liter.
 - 5. Fire Retardant Coatings: a maximum concentration of volatile organic compounds of 650 grams per liter.

2.02 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this paragraph, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
 - 1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

- B. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
 - 1. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi ; modulus of elasticity, 300,000 psi ; internal bond, 80 psi ; and screw-holding capacity on face and edge, 250 and 225 lbf , respectively.
 - 2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi ; modulus of elasticity, 250,000 psi ; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf , respectively.
- C. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

2.03 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Section 08 7100 - DOOR HARDWARE.
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Catches:
 - 1. Magnetic catches, BHMA A156.9, B03141
 - 2. Push-in magnetic catches, BHMA A156.9, B03131
 - 3. Roller catches, BHMA A156.9, B03071
 - 4. Ball friction catches, BHMA A156.9, B03013.
- E. Adjustable Shelf Standards and Supports:
 - 1. BHMA A156.9, B04071; with shelf rests, B04081
 - 2. BHMA A156.9, B04102; with shelf brackets, B04112.
- F. Drawer Slides: BHMA A156.9, B05091.
 - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
- G. Door Locks: BHMA A156.11, E07121.
- H. Drawer Locks: BHMA A156.11, E07041.
- I. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel 630.

- K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.04 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.05 FABRICATION, GENERAL

- A. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- B. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood [Lumber] Members 3/4 Inch Thick or Less: 1/16 inch.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Commissioner seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.06 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. WD-7, Wood Species and Cut: Match species and cut indicated for wood wall panels, unless otherwise indicated.

- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- E. Assemble casings in plant except where limitations of access to place of installation require field assembly.

2.07 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Wood Species: Poplar.
- C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- D. Assemble casings in plant except where limitations of access to place of installation require field assembly.

2.08 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Wood Species: Poplar.

2.09 FLUSH WOOD PANELING

- A. Grade: A.
- B. Wood Species and Cut:
 - 1. WD-3, Wood Wall Panels at Level 1 (with exception of Stair 01): HPVA HP-1, Birch, Rotary, Whole Piece Face, Grade A.
 - 2. WD-6, Wood Wall Panels at Level 2 and also including Stair 01 at Level 1: HPVA Birch, Rotary, Whole Piece Face, Grade A on Fire-Retardant-Treated Panel.
 - 3. Lumber Trim and Edges: At fabricator's option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.
- C. Panel-Matching Method: Match panels within each separate area by the following method:
 - 1. Sequence and end-matched, manufactured to the sizes as indicated on the Drawings, with adjustments as required to match field dimensions. Wood grain to run vertically. Where end match is required for height, use architectural end match as defined on page 242 of AWI Quality Standards, 8th Edition.
- D. Vertical Panel-Matching Method: Continuous match; veneer leaves of upper panels are continuations of veneer leaves of lower panels.
- E. Fire-Retardant-Treated Paneling: Provide panels consisting of wood veneer and fire-retardant particleboard or fire-retardant medium-density fiberboard. Panels shall have flame-spread index of 25 or less and smoke-developed index of 450 or less per ASTM E 84; and shall meet Class A rating per UL 723 / NFPA 235.

2.10 WOOD CABINETS

- A. Grade: A.
- B. AWI Type of Cabinet Construction: Flush overlay.
- C. Exposed Surfaces: Hardwood Veneer Plywood complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: HPVA HP-1, Birch, Rotary, Whole Piece Face, Grade A.
 - 2. Vertical Surfaces: HPVA HP-1, Birch, Rotary, Whole Piece Face, Grade A.
 - 3. Edges: Hardwood edge banding of the same species.
- D. Materials for Semi-exposed Surfaces:
 - 1. HPVA HP-1, Birch, Rotary, Whole Piece Face, Grade B or C.
 - a. Edges of Shelves: Hardwood edge banding of the same species.
 - 2. Drawer Sides and Backs: HPVA HP-1, Birch, Rotary, Whole Piece Face, Grade B or C.
 - 3. Drawer Bottoms: HPVA HP-1, Birch, Rotary, Whole Piece Face, Grade B or C.

2.11 SOLID-WOOD COUNTERTOPS

- A. Grade: Custom.
- B. WD-5: Wood Countertops:
 - 1. Solid Birch Butcherblock Countertop.
- C. Thickness: 1 1/2 inch.
- D. Finishes: Non-Toxic, Hypoallergenic clear matte finish
- E. Fabricate tops in one piece, unless otherwise indicated.
 - 1. Laminated Edge Grain Countertop; strips running parallel to the long dimension of the countertop.

2.12 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.
- C. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 9 painting Sections for material and application requirements.
- D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

- E. Transparent Finish:
 - 1. Grade: Premium.
 - 2. AWI Finish System: Catalyzed polyurethane.
 - 3. Staining: Match Commissioner's sample.
 - 4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 - 5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 - 6. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 EXECUTION

3.01 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 - 2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

- H. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless otherwise indicated.
 - 1. Install flush paneling with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- I. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or toggle bolts through metal backing or metal framing behind wall finish.
- J. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 - 3. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces.

END OF SECTION

SECTION 07 1113 - BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. WP-4: For Dampproofing of Below Grade Walls:
 - 1. Bituminous dampproofing.
 - 2. Protection boards.
 - 3. Drainage panels.

1.03 RELATED REQUIREMENTS

- A. Section 07 2100 - Thermal Insulation: Rigid insulation board used as protection board.

1.04 REFERENCE STANDARDS

- A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011.
- B. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.
- C. ASTM D2822/D2822M - Standard Specification for Asphalt Roof Cement, Asbestos-Containing; 2005 (Reapproved 2011)e1.
- D. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2012)e1.
- E. NRCA ML104 - The NRCA Roofing and Waterproofing; National Roofing Contractors Association; Fifth Edition, with interim updates.
- F. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 SUBMITTALS

- A. See DDC General Conditions, for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide properties of primer, bitumen, and mastics.

- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 DAMPPROOFING PRODUCTS

- A. WP-4: Bituminous Dampproofing: Cold-applied, spray-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by spray, brush, roller, or squeegee; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition: ASTM D4479 Type I, minimum.
 - 2. VOC Content: Not more 250 grams per liter, NYC EPP 2012.
 - 3. Applied Thickness: 1/16 inch, minimum, wet film.
 - 4. Products:
 - a. W.R. Meadows, Inc.; Sealmastic Spray-Mastic: www.wrmeadows.com.
 - b. Henry Company; Henry 795 Foundation Coating: www.henry.com.
 - c. Monopole, Inc.; Monochem Black Emulsion: www.monopoleinc.com.
 - d. or approved equal.
- B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.02 COLD ASPHALTIC MATERIALS

- A. Bitumen: Emulsified asphalt, ASTM D1227; with fiber reinforcement other than asbestos (Type II).
- B. Asphalt Primer: ASTM D41/D41M, compatible with substrate.
- C. Sealing Mastic: Asphalt roof cement, ASTM D2822, Type I.

2.03 ACCESSORIES

- A. Drainage Panel: 1/4 inch thick formed plastic, hollowed sandwich.
- B. Protection Board: Rigid insulation specified in Section 07 2100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items that penetrate surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.03 APPLICATION

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Perform work in accordance with NRCA Roofing and Waterproofing Manual.
- C. Prime surfaces at a rate of 2 gal/100 sq ft. Permit primer to dry.
- D. Apply bitumen with mop.
- E. Apply bitumen in two coats, continuous and uniform, at a rate of 25 sq ft/gal per coat.
- F. Apply from 2 inches below finish grade elevation down to top of footings.
- G. Seal items projecting through dampproofing surface with mastic. Seal watertight.
- H. Place drainage panel directly over dampproofing, butt joints, place to encourage drainage downward.
- I. Place protection board over drainage panel, butt joints, and adhere with mastic.
- J. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

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SECTION 07 2100 - THERMAL INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall, underside of floor slabs, and over roof deck.

1.03 RELATED REQUIREMENTS

- A. Section 07 2150 - Sprayed-on Cellulosic Thermal Insulation
- B. Section 07 2160 - Continuous Insulation Wall Panels
- C. Section 07 2500 - Weather Barriers: Water-Resistive Air Barrier Membranes.
- D. Section 07 5400 - Thermoplastic Membrane Roofing: Insulation specified as part of roofing system.
- E. 07 5323 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM)
- F. Section 07 5563 - Green Roof Assembly
- G. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
- H. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.
- I. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.04 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- D. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 SUBMITTALS

- A. See DDC General Conditions, for submittal procedures.

- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data on product characteristics and performance criteria.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: **INSUL-1** - Extruded polystyrene board.
- B. Insulation at Perimeter of Foundation: **INSUL-1** - Extruded polystyrene board.
- C. Composite Insulating Wall Panels: **INSUL-4** - Polyisocyanurate board.
- D. Insulation at Metal Framed Walls: See Sections 07 2150 and 07 2160.
- E. Insulation Over Roof Deck: **INSUL-1** - Extruded polystyrene board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene Board Insulation: **INSUL-1** - Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. R-value; 1 inch of material at 72 degrees F: 5, minimum.
 - 4. Board Size: 48 x 96 inch.
 - 5. Board Thickness: 2 inches.
 - 6. Board Edges: Square.
 - 7. Thermal Conductivity (k factor) at 25 degrees F: 0.18.
 - 8. Compressive Resistance: 40 psi.
 - 9. Board Density: 1.3 lb/cu ft.
 - 10. Water Absorption, Maximum: 0.3 percent, by volume.
 - 11. Manufacturers:
 - a. Dow Chemical Co: www.dow.com.
 - b. Owens Corning Corp: www.owenscorning.com.
 - c. Kingspan Insulation LLC; GreenGuard XPS TYPE VI 40 PSI: www.trustgreenguard.com.
 - 12. or approved equal.
- B. Composite Polyisocyanurate Board Insulation Faced with Plywood: **INSUL-4** - Rigid cellular foam, complying with ASTM C1289; Type V, fire-retardant-treated plywood one face, glass fiber mat facer one face, Class 3.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.

2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Compressive Strength: 16 psi
4. Board Size: 48 x 96 inch.
5. Plywood Thickness: 5/8 inch.
6. Insulation Board Thickness: 1-1/2 inch.
7. Thermal Resistance: R-value of 12.7.
8. Board Edges: Square.
9. Recovered Materials Content: 9%
10. Manufacturers:
 - a. Hunter Panels, LLC; Xci Ply: www.hunterxci.com.
 - b. Atlas Roofing; ACFoam Nailbase: www.atlasroofing.com.
 - c. GAF Cornell; Thermacal Non-Ventilated: www.cornellcorporation.com.
11. or approved equal.

2.03 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- B. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- C. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Install boards horizontally on foundation perimeter.
 1. Place boards to maximize adhesive contact.
 2. Install in running bond pattern.
 3. Butt edges and ends tightly to adjacent boards and to protrusions.
 4. Extend to bottom of foundation.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS (SEE ALSO SECTION 07 2160 CONTINUOUS WALL INSULATION PANELS)

- A. Install boards horizontally on walls.

1. Install in running bond pattern.
 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape and seal in place to ensure continuity of vapor retarder and air seal.
- D. Tape and seal insulation board joints.

3.04 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.
- D. Extend horizontally to an equal length as the insulation extends vertically down the foundation wall.

3.05 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
1. See applicable roofing specification section for specific board installation requirements.
 2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions .
 3. Do not apply more insulation than can be covered with roofing in same day.

3.06 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 2150 - SPRAYED-ON CELLULOSIC THERMAL INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENT

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum, and [5] the Contract [City of New York Standard Construction Contract]

1.02 SECTION INCLUDES:

- A. Spray-applied cellulosic insulation; INSUL-2.

1.03 RELATED SECTIONS:

- A. Section 07 2100 - Thermal Insulation: for batt and board types of building insulation.

1.04 REFERENCED STANDARDS

- A. ASTM C 1149 - 11 - Standard Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation.
- B. ASTM C 1497 - 12 - Standard Specification for Cellulosic Fiber Stabilized Thermal Insulation.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- E. CPSC Standard CFR Parts 1209 and 1404.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
- G. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Manufacturer to provide current data sheets on all materials intended for use on the project.
- D. Installation instructions for type of material and application method required
- E. Field Quality Control Procedures to be utilized by the contractor/applicator to insure proper installation of the sprayed in place insulation system.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have not less than 3 years successful experience providing installations similar to that required for this project, and shall be properly trained by the insulation manufacturer.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data.
- B. Store materials above ground, in a dry location, protected from the weather. Remove damaged packages found unsuitable from the project site and replace.

1.08 PROJECT CONDITIONS

- A. When the prevailing outdoor temperature at the building is less than 40 deg. F., a minimum substrate and ambient temperature of 40 deg. F. shall be maintained prior to during and a minimum of 24 hours after the application of the spray insulation.
- B. Provide ventilation to allow proper drying of the sprayed insulation during and subsequent to its application. An enclosed area is ventilation of not less than 3 complete air changes per hour.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sprayed-on Cellulosic Thermal Insulation
 - 1. National Fiber; CEL-PAK: www.nationalfiber.com
 - 2. NU-WOOL Co. Inc., NU-WOOL Premium Cellulose Insulation: www.nuwool.com
 - 3. International Cellulose Corporation; Celbar: www.spray-on.com

2.02 MATERIALS

- A. Cellulose Insulation manufactured from recycled newspapers. Each pound of insulation shall contain minimum 80% paper fiber content. The fibers shall be treated with boric acid and sodium polyborate to create permanent flame resistance. Cellulose Insulation shall contain an E.P.A. registered fungicide, making it resistant to mold growth. The additives shall be non-toxic, non-corrosive, shall not irritate normal skin, shall not give off odor during or after installation, nor shall it attract vermin or insects.
- B. Post-Consumer Paper Content per NYC EPP, 2012:
 - 1. Minimum Post Consumer Content: 75%
- C. Density: ASTM C-739 is 1.6 lbs per cu.ft.

- D. Moisture Vapor Sorption: Insulation shall meet the requirements of ASTM C 739 of less than 15% maximum weight gain under test conditions. Variations in relative humidity shall not affect the thermal properties of the insulation.
- E. Thermal Performance: R-value of 3.8 per inch.
- F. Flammability: Critical Radiant Flux: greater than or equal to 0.12 watts/cm². Smoldering Combustion: less than or equal to 15%.
- G. Surface Burning Characteristics: Surface burning characteristics are determined using two methods. Critical radiant flux using test method ASTM E 970 and ASTM E 84.
 - 1. ASTM E 970 Greater than 0.12 watts/cm²
 - 2. ASTM E 84 Less than 25, Class 1

PART 3 EXECUTION

3.01 INSPECTION AND PREPARATION

- A. All rough plumbing, electrical, telephone and data lines must first be completed by other trades prior to application of the sprayed application.
- B. Examine surface scheduled to receive insulation for voids, projections, and foreign substances on surfaces, lack of caulking at plates, or other items, which might interfere with integrity of complete wall system.
- C. Clips, hangers, supports, sleeves and other attachments to spray bases are to be placed by other trades prior to the application of sprayed insulation. Ducts, piping, conduit or other suspended equipment shall not be positioned until after the application of sprayed insulation.
- D. Clean substrates of substances, which might be incompatible with or interfere with bond including oil, dirt, scale, rust and non-compatible shop primer. Prepare surfaces, including removing projections and filling voids, which interfere with placement of insulation.
- E. Assure that rough plumbing, electrical conduit and boxes, and other items required to penetrate the sprayed thermal insulation are installed before applying thermal insulation.
- F. Prime substrates where recommended by insulation manufacturer, covering surfaces to receive direct-bonded application.
- G. Cover other work, which might be damaged by fall-out or over-spray. Provide temporary enclosure as may be required to confine operations, protect the environment, and ensure adequate ambient conditions including temperatures within limits recommended by manufacturer.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions for particular conditions of installation in each case. Consult with manufacturer's technical representative for conditions not covered by printed instructions.

- B. Insulation shall be applied in consistent depths throughout the areas indicated to achieve the specified R-value. Insure air sealing around pipes and other items penetrating the insulated plane using caulks and foam sealants.
- C. Insulation should be applied according to the manufacturer's coverage chart listed on the package. This insures that coverage is dependent on weight rather than inches.
- D. Spray-force material into all cracks, holes, seams; seal around ducts and plumbing.
- E. Provide thicknesses as indicated. Extend insulation full thickness over entire area to be protected. Except as otherwise indicated or recommended by manufacturer, install in a single course.

3.03 CLEANING, PATCHING, PROTECTION

- A. Immediately upon completion of spraying operations in each containable area of project, remove over-spray and fall-out of materials from surfaces of the work, and clean surfaces to remove evidence of soiling. Repair or replace damaged work to restore surfaces to acceptable condition.
- B. Minimize the need for other trades to cut into or remove installed insulation. As other trades successively complete installations of other work, patch installations, which have been cut away.

END OF SECTION

SECTION 07 2160 - CONTINUOUS INSULATION WALL PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Continuous insulation wall panels. INSUL-4

1.03 RELATED SECTIONS

- A. Section 03 3000 - Cast In Place Concrete
- B. Section 07 2500 - Weather Barriers
- C. Section 07 4170 - Terracotta Rainscreen Tile Cladding System
- D. Section 09 2116 - Gypsum Board Assemblies

1.04 REFERENCES

- A. ASTM C 209 - Methods of Testing Insulating Board, Structural and Decorative.
- B. ASTM C 1289 - Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.
- C. ASTM D 1621 - Test Methods for Compressive Properties of Rigid Cellular Plastics.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.
- F. NFPA 285 - Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
- G. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 DESIGN REQUIREMENTS

- A. Perform work in accordance with all federal, state and local codes.
- B. Physical properties (Foam Core):
 - 1. Compressive Strength: ASTM D 1621; Grade 2, 20 psi (138 kPa) minimum or Grade 3, 25 psi (172 kPa).

2. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
 3. Moisture Vapor Permeance: ASTM E 96, less than 1 perm (57.5ng/(Pa•s•m2)).
 4. Water Absorption: ASTM C 209, less than 0.1 percent by volume.
 5. Service Temperature: Minus 100 degrees to 250 degrees F (Minus 73 degrees C to 122 degrees C).
 6. Resistance to Mold: ASTM D 3273 Passed (10).
- C. Fire Retardant Treated Plywood: Flame spread rating of 25 or less when tested in accordance with ASTM E 84.

1.06 SUBMITTALS

- A. Submit under provisions of DDC General Conditions.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Manufacturer's data sheets on wall panels and fasteners to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- D. Manufacturer's Certificate: Certify panels will conform to specified performance requirements.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures and assembles specified insulation in house with no outside fabrication operations.
- B. Pre-Installation Meeting: Convene minimum one week prior to commencing Work of this section. Review installation procedures and coordination required with Related Work and include the following:
1. Participants: Authorized representatives of the Contractor, Commissioner, Installer, and Manufacturer.
 2. Review wall assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
 3. Review continuous insulation wall panels installation methods and procedures related to application, including manufacturer's installation guidelines.
 4. Review firestopping requirements and weather resistive membrane requirements and placement locations.
 5. Review field quality control procedures.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products off the ground, in dry conditions, under cover and in manufacturer's unopened packaging until ready for installation.

1.09 SEQUENCING

- A. Coordinate with the installation of weather barrier materials specified in Section 07 2500.

- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Hunter Panels; Xci Ply: www.hunterxci.com
 - 2. Atlas Roofing; AC Foam Nailbase
 - 3. GAF Cornell; Thermacal Non-Ventilated: www.cornellcorporation.com

2.02 BOARD INSULATION

- A. Board Insulation Bonded to Plywood: a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded on one side to a premium performance coated glass facer on one side and fire treated plywood on the other.
 - 1. Type: ASTM C 1289, Type V:
 - a. Grade 3 (25 psi).
 - 2. Fire Retardant Treated Plywood Thickness:
 - a. 5/8 inch.
 - 3. Panel Size:
 - a. 4 feet by 8 feet (1220 mm by 2440 mm).
 - 4. Thickness / R Value: Long Term Thermal Resistance Values based on ASTM C 1289 and CAN/ULC S770 with a 15-year time weighted average.
 - a. 2.1 inches (53 mm) / R Value 9.6.
 - 5. Recovered Materials Content: 9% per NYC EPP, 2012.

2.03 APPLICATION

- A. NFPA 285 Exterior Wall Assembly – Steel Stud:
 - 1. Base Wall System: Steel Stud, 1 layer 5/8 inch (16 mm) thick Type X Gypsum wallboard on interior, installed over steel studs: minimum 3-5/8 inches (91 mm) depth, minimum 22 gauge at a maximum of 24 inches (610 mm) o.c. with lateral bracing every 4 foot (1220 mm) vertically.
 - 2. Approved Exterior Finish:
 - a. Terra Cotta Cladding: See Section 07 4170 Terracotta Rainscreen Tile Cladding System.
 - 3. Panel Thickness: 3.7 inches (94 mm) maximum.
 - 4. Stud Cavity: Any non-combustible insulation or none.
 - 5. Exterior Sheathing: 5/8 inch (16 mm) thick exterior type glass faced gypsum sheathing.

6. Weather Resistive Membrane Applied to Gypsum sheathing if used; Acceptable products are:
 - a. VaproShield, LLC; WrapShield: www.vaproshield.com.
 - b. Cosella-Dörken Products Inc., DELTA-FASSADE S: www.cosella-dorken.com
 - c. Pro clima international; SOLITEX FRONTA QUATTRO: www.proclima.com.

2.04 PANEL FASTENERS

- A. Fasteners shall be a corrosion resistant type with oversized heads. Length of fasteners shall be as recommended by the panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until exterior walls have been properly prepared.
- B. Verify that all exterior wall assembly construction has been completed to the point where the insulation may correctly be installed.
- C. Verify that mechanical and electrical services in walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.
- D. If wall assembly preparation is the responsibility of another installer, notify Commissioner of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in exterior spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.
- E. Exposed insulation must be protected from open flame and kept dry at all times.
- F. Install weather barriers over insulation panels as specified in Section 07 2505.
- G. Exterior wall insulation is not intended to be left exposed for extended periods of time in excess of 45-60 days without adequate protection. If extended exposure is anticipated all exposed foam surfaces including corners, window and door openings, should be taped with a compatible waterproof tape.

- H. Install exterior cladding as recommended by the cladding manufacturer and as specified in other sections of this specification.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.
- C. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of vapor barrier and/or roof covering.
- D. Repair or replace damaged products before Substantial Completion.

END OF SECTION

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FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

CONTINUOUS INSULATION WALL
PANELS
07 2160 - 6

SECTION 07 2500 - WEATHER BARRIERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. WP-1: Vapor Barrier; Under slab on grade
- B. WP-2: Water-Resistive Air Barrier: Under exterior wall cladding, over sheathing or other substrate; materials that form a system to stop passage of air and water through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and joints between dissimilar materials.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.
- C. Section 07 9005 - Joint Sealers: Sealants and joint backing

1.04 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.

1.05 REFERENCE STANDARDS

- A. AATCC Test Method 30 - Antifungal Activity, Assessment on Textile Materials: Mildew and Rot Resistance of Textile Materials; 2013.
- B. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2013.

- C. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2010.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. ASTM 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- G. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- H. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
- I. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep slope roofing Underlayment for Ice Dam Protection. (Nail Sealability)
- J. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.; 2013.
- K. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; ICC Evaluation Service, Inc.; 2011.

1.06 SUBMITTALS

- A. See DDC General Conditions, for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Submit documentation from an approved independent testing laboratory certifying compliance with:
 - 1. The air leakage rates of the air barrier membrane assembly, including primary membrane, primer and sealants have been tested to meet ASTM E2357
 - 2. ICC-AC 38
 - 3. Class A flame spread index and smoke development per ASTM E-84.
- D. Submit documentation from an approved independent testing laboratory certifying the air leakage and vapor permeance rates of the air barrier membrane, including primary membrane and transition sheets are in accordance with ASTM E2178.
 - 1. Test report submittals shall include test results of sustained wind loads and gust load air leakage results.
- E. Manufacturer's technical data sheets and material safety data sheets for product and accessories.
- F. Manufacturer's installation instructions.
- G. Certification of compatibility by manufacturer, listing all materials on the project with which the product and accessories may come into contact.
- H. Sample of product, detail flashing and transition membrane.

1.07 MOCK-UP

- A. Install Water-Resistive Air Barrier materials in mock-up specified in Section 07 4170.

PART 2 PRODUCTS

2.01 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. **WP-2: Water-Resistive Air Barrier Sheet:**
 - 1. Air Permeance: 0.002 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 50 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 - 3. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 6 months weather exposure.
 - 4. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
 - 5. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches wide, compatible with sheet material; unless otherwise specified.
 - 6. Products:
 - a. VaproShield, LLC; WrapShield: www.vaproshield.com.
 - b. Cosella-Dörken Products Inc., DELTA-FASSADE S: www.cosella-dorken.com.
 - c. Pro clima international; SOLITEX FRONTA QUATTRO: www.proclima.com.
 - d. or approved equal.

2.02 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

- A. **WP-1: Vapor Retarder Sheet :** ASTM D4397 polyethylene film reinforced with glass fiber square mesh, clear.
 - 1. Thickness: 20 mil.
 - 2. Water Vapor Permeance: As required by referenced standard for thickness specified.

2.03 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Primary water-resistive vapor permeable air barrier membrane components and accessories must be obtained from a single source to ensure system compatibility and integrity.
- C. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Water-Resistive Vapor Permeable Air Barriers: Install continuous air and water tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- D. Mechanically Fastened Sheets - On Exterior:
 - 1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 - 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 - 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
 - 4. Seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 - 5. Where stud framing rests on concrete or masonry, extend lower edge of sheet at least 4 inches below bottom of framing and seal to foundation with sealant.
 - 6. Install air barrier and vapor retarder UNDER jamb flashings.
 - 7. Install head flashings under weather barrier.
 - 8. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
 - 3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
 - 4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
 - 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 - 6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. Do not cover installed weather barriers until required inspections have been completed.
- B. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

- C. Take digital photographs of each portion of the installation prior to covering up.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

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SECTION 07 4170 - TERRACOTTA RAINSCREEN TILE CLADDING SYSTEM

PART 1-GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. Section includes: Exterior wall cladding system consisting of flat, double-skin, terracotta panels installed with aluminum panel clips attached to aluminum vertical framing sections anchored to structural wall substrate and utilizing the rainscreen principle.
- B. Related sections:
1. Section 03 3000 - Cast-in-Place Concrete
 2. Section 07 2100 - Thermal Insulation: insulation installed behind terracotta cladding system.
 3. Section 07 2500 - Weather Barriers: Sheet air infiltration barrier installed in cavity behind terracotta cladding panels.
 4. Section 06 1000 - Rough Carpentry
 5. Section 09 2116 - Gypsum Board Assemblies

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM) Publications:
1. ASTM C97-02 - Absorption and Bulk Specific Gravity of Dimension Stone.
 2. ASTM C880-96-Standard Test Method for Flexural Strength of Dimension Stone.
 3. ASTM E330 - Structural Performance of Exterior Window, Curtain Walls, and Doors Under the Influence of Wind Loads.
 4. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
 5. ASTM E 1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference

1.04 DEFINITIONS

- A. Rainscreen Principle: Method for controlling rain penetration through wall cladding system. Open joints allow air pressure in cavity behind cladding to equal outside air pressure thus resisting wind driven rain. Rainscreen system includes:
1. Drained and vented wall cladding.
 2. Air barrier on cladding substrate.
 3. Compartmentalization of cavity behind cladding into sealed compartments.
 4. Flashings and weep holes to drain water from cavity.

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

TERRACOTTA RAINSCREEN TILE
CLADDING SYSTEM
07 4170 - 1

1.05 SYSTEM DESCRIPTION

- A. General: The terracotta tile system is non combustible wall façade with a rainscreen, pressure equalized design consisting of double skinned terracotta tiles of varying sizes with an aluminum supporting sub framing.
- B. Methods of Installation
 - 1. Field Applied: The terracotta system is applied to the framing on site.
- C. Acceptable Substrates:
 - 1. Continuous Insulation Wall Panel with Intergrated Exterior Grade Plywood Sheathing
 - 2. Exterior Grade Gypsum Sheathing - ASTM 1396
 - 3. Exterior Sheathing with water resistant core with fiberglass facers - ASTM 1177 Structurally Sound Brick, Masonry, CMU

1.06 PERFORMANCE REQUIREMENTS

- A. Terracotta cladding and attachment system to:
 - 1. Provide in conjunction with wall substrate and air barrier a weathertight wall assembly utilizing rainscreen principle.
 - 2. Withstand design loads as required by applicable codes for Project location.
 - 3. Adequately resist wind forces and uplift for Project location for wall surface, for parapet and corner panels tested in accordance with ASTM E330.
 - 4. Accommodate movement of cladding components without undue stress on fasteners or other detrimental effects, when subjected to seasonal temperature range of:
 - a. Ambient: 120 degrees F.
 - b. Cladding surface: 180 degrees F.
 - 5. Accommodate tolerances of support structure.
 - 6. Assure non combustibility of all components including tiles, sub support frame and all components therein.

1.07 SUBMITTALS

- A. Provide in accordance with DDC General Requirements:
 - 1. Product data describing materials and fabrication for terracotta panels and attachment components.
 - 2. Shop drawings showing:
 - a. Profiles and dimensions for tiles, special shapes, and trim pieces.
 - b. Installation details: Attachment methods, fasteners, joints, corners, openings, intersections with adjacent materials, flashings, closures, trim and other critical conditions.
 - c. Layout of terracotta panels on wall and locations of special pieces and trim.
 - 3. Structural and pressure differential calculations.
 - 4. Copies of certificates, reports, and other data showing compliance with design and performance requirements.
 - 5. Samples:
 - a. 12 inches minimum length of terracotta panel in selected color and surface finish.
 - b. 3 inches minimum length of attachment rail.

6. Manufacturer's installation and maintenance instructions.
 7. Copy of warranty for review by Commissioner.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.

1.08 QUALITY ASSURANCE

- A. Attachment details shall be designed under direct supervision of a professional structural engineer licensed in the State of New York. Calculations and shop drawings shall bear seal of supervising engineer.
- B. In accordance with DDC General Requirements, supplier's field representative shall inspect wall substrate and air barrier prior to installation, observe terracotta cladding installation, and submit report of observations and findings to Architect.
- C. Manufacturer Qualifications:
1. 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.
 2. All materials and components shall be manufactured and sold by the same company or its authorized distributor.
- D. 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.
 2. Company experienced in installing exterior wall cladding systems and properly trained by the terracotta cladding supplier.

1.09 MOCK - UP

- A. In accordance with DDC General Requirements, prepare separate mock-up illustrating wall substrate with attached terracotta cladding. Mock-up shall demonstrate wall performance and establish standard of quality and workmanship. Illustrate terracotta panels, attachment method, thermal insulation, furring, sheathing, air barrier, joints, flashings, corner conditions, parapet, sills, flashings and workmanship.
- B. Mock-up shall be wall segment with corner & opening constructed with:
1. Slab or foundation support.
 2. Wall substrate with thermal insulation, sheathing, and air barrier.
 3. Terracotta panels installed with framing section, wall brackets, and panel clips.
- C. Approximate size: 10 by 10 feet.
- D. Accepted sample may remain as part of work and will be used as basis for acceptance of remaining cladding. Unacceptable samples shall be removed.
- E. Test mock-up with water hose and other means to verify performance.

1.10 WARRANTY

- A. Manufacturer's Warranty: Warrant that the terracotta tiles and aluminum substructure shall be free of material defects for a period of five (5) years. Failure or defects are to be determined by representatives of the manufacture.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Boston Valley Terra Cotta: www.bostonvalley.com.
- B. Acceptable manufacturers:
1. Boston Valley Terra Cotta: www.bostonvalley.com.
 2. Terreal Terra Cotta, North America: www.terreal.us.
 3. NBK North America: www.nbkterracotta.com.
 4. or approved equal.

2.02 TERRACOTTA PANEL CLADDING SYSTEM

- A. Type:
1. CT-2: Exterior wall cladding system consisting of custom formed terracotta shapes mounted on aluminum framing sections.
 2. CT-3: Exterior wall cladding system consisting of flat, double-skin, terracotta panels hung on vertical aluminum framing sections.
- B. Cladding support: Terracotta panels installed with aluminum clips attached to aluminum vertical framing sections anchored with brackets to wall substrate.
- C. Material: Glazed, frost proof, fired clay.
1. Compressive strength tested in accordance with ASTM C67.
- D. Overall panel size as indicated on the drawings.
- E. Surface finish: high gloss colored glazed finish
- F. Colors: three separate tones of red to match Commissioner's samples

2.03 SUPPORT COMPONENTS AND ACCESSORIES

- A. Aluminum support framing system: Complete, pre-engineered aluminum track, clip, complying with the following.
1. Panels fastened at head grooves and base channels using aluminum clips inserted into vertical track.
 2. The aluminum vertical track is fastened to the building wall system as shown on the Construction Documents or Installation Contractor's Shop Drawings.

3. The replacement of damaged panels, particularly in the field, must be possible using simple methods and shall not require special tools nor damage the surrounding panels.
4. Silicone gaskets, where visible and required, shall be colored to match the panel or as specified by the architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine walls to receive terracotta cladding. Ensure substrate is structurally sound, clean and free of contaminants which inhibit bond of air barrier.
 1. Maximum substrate deflection: L/360
 2. Maximum substrate surface variation: 1/8 inch in 10 feet.
- B. Do not proceed with terracotta cladding installation until deficiencies have been addressed.

3.02 PREPARATION

- A. Water-Resistive Air Barrier: Install air/vapor barrier to wall sheathing as specified in 07 2500 - Weather Barriers and as detailed on drawings and approved shop drawings.
- B. Framing sections: Anchor vertical, aluminum framing sections with attachment brackets using engineered fasteners and anchors to accomplish performance requirements.
- C. Flashings: Install sheet metal flashings, pressure compartment dividers and trim and as positioned and detailed on drawings and approved shop drawings. Ensure flashings at bottom of wall and pressure compartments properly drain water from air cavity to exterior through weep holes. Turn up flashings 4 inches minimum and seal to substrate. Lap flashing end joints 6 inches and seal watertight.

3.03 CLADDING INSTALLATION

- A. Do not install broken, chipped or cracked units.
- B. Apply coat of bituminous paint on concealed aluminum surfaces to be in contact with steel, cementitious, and dissimilar materials.
- C. Install clay panel cladding system to wall assembly specified in accordance with the approved shop drawings and their manufacturer's instructions.
- D. Conceal fasteners.
- E. Place clay panel units in stack bond to lines and levels, plumb, with uniform, parallel joints, or as indicated on the shop drawings in accordance with their manufacturer's instructions.
 1. Use caution to prevent damage to clay panel units.
 2. When field-cutting, use caution to ensure that cuttings do not remain on exposed surfaces. Cut edges shall be sharp, without spalling.
 3. Cutting shall be performed with a diamond tipped wet saw.

- F. Ensure that assembly is plumb, level and free of warp or twist; maintain dimensional tolerances and alignment with adjacent work.
- G. Built-in work:
 - 1. As work progresses, build in flashing and other items.
 - 2. Where applicable, remove protective film from finished aluminum surfaces.
- H. Tolerances: Accurately align and locate components to column lines and floor levels; adjust work to conform to the following tolerances.
 - 1. Plumb: 1/8-inch in 10 feet; 1/4-inch in 40 feet; non-cumulative.
 - 2. Level: 1/8-inch in 20 feet; 1/4-inch in 40 feet; non-cumulative.
 - 3. Alignment: Limit offset to 1/16-inch where surfaces are flush or less than 1/2-inch out of flush, and separated by less than 2 inches by reveal or protruding work; otherwise limit offsets to 1/8 inch.
 - 4. Location: 3/8-inch maximum deviation from measured theoretical location any member, and location.
 - 5. Lipping between units: 1/16 inch maximum.

3.04 CLEANING AND PROTECTION

- A. Clean soiled surfaces using materials which will not harm clay panel units or adjacent materials, as recommended by the clay panel manufacturer (clean with mild detergent using a natural bristle brush, starting from top of building to the bottom). Use non-metallic tools in cleaning operations. Do not use wire brushes, metallic tools or abrasives for cleaning. Pressure washer not to exceed 1200 psi.
- B. Upon completion of installation, remove protective coatings or coverings and clean aluminum surfaces, exercising care to avoid damage of finish.
- C. Remove excess sealant compounds, dirt or other foreign substances.
- D. Protect cladding from roof run-off, splashed water, mud, sealants, bitumen and other contaminants from remaining construction activities.
- E. Remove and replace clay panel units that are broken, chipped, cracked, abraded or damaged during construction period. Reinstall in accordance with their manufacturer's instructions.

END OF SECTION

SECTION 07 5323 - ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. WP-3: EPDM membrane roofing system, including all components specified.
- B. Comply with the published recommendations and instructions of the roofing membrane manufacturer.
- C. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.
- B. Section 07 2100 - Thermal Insulation
- C. Section 07 6200 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.
- D. Section 07 7100 - Roof Specialties: Manufactured copings, fascias, gravel stops, and other flashing-related items.

1.04 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- D. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
 2. Notify Commissioner well in advance of meeting.

1.06 SUBMITTALS

- A. See DDC General Conditions, for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data:
1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
- D. Samples: Submit samples of each product to be used.
- E. Shop Drawings: Provide:
1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
- F. Specimen Warranty: Submit prior to starting work.
- G. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications.
- H. Executed Warranty.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. 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. 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.
 2. Installer shall have current approval, license, or authorization as applicator by the manufacturer.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather protective covering.
- C. Keep combustible materials away from ignition sources.

1.09 WARRANTY

- A. See DDC General Conditions, for additional warranty requirements.
- B. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- C. Warranty: Warranty covering membrane, roof insulation, and other indicated components of the system, for the term indicated.
 - 1. Limit of Liability: No dollar limitation.
 - 2. Scope of Coverage: Repair leaks in the roofing system caused by:
 - a. Ordinary wear and tear of the elements.
 - b. Manufacturing defect in materials.
 - c. Defective workmanship used to install these materials.
 - d. Damage due to winds up to 55 mph.
 - 3. Not Covered:
 - a. Damage due to winds in excess of 55 mph.
 - b. Damage due hurricanes or tornadoes.
 - c. Hail.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Firestone Building Products LLC: www.firestonebpc.com.
 - 2. Carlisle Roofing Systems, Inc: www.carlisle-syntec.com.
 - 3. GAF: www.gaf.com.
- B. or approved equal.

2.02 ROOFING SYSTEM DESCRIPTION

- A. Roofing System: Ethylene-propylene-diene-monomer (EPDM) single-ply membrane.
 - 1. Membrane Attachment: Fully adhered.
 - 2. Warranty: Full system warranty; 30 Year Warranty covering membrane, roof insulation, and membrane accessories.

3. Energy Star: EPDM membrane shall be Energy Star labeled per NYC EPP, 2012.
4. Recovered Post-Consumer Content: 100%
5. VOC content of roof coatings, thermoplastic coatings or waterproofing sealers shall not exceed 550 grams per liter per NYC EPP, 2012.
6. Comply with applicable local building code requirements.

2.03 EPDM MEMBRANE MATERIALS

- A. Roofing and Flashing Membrane: Black, cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
 1. Nominal Thickness Tolerance: Plus/minus 10 percent.
- B. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- C. Flashing Membrane: Self-curing, non-reinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D4811 Type II, and with the following properties:
 1. Thickness: 0.055 inch.
- D. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil EPDM tape adhesive.
- E. Self-Adhesive Lap Splice Tape: 35 mil EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer.
- F. Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces.
- G. Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive, with VOC content less than 550 grams per liter.
- H. Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.
- I. Termination Bars: Aluminum bars with integral caulk ledge.

2.04 ROOF INSULATION AND COVER BOARDS

- A. See Section 07 2100 - Thermal Insulation for INSUL-1 - Extruded polystyrene board.

PART 3 INSTALLATION

3.01 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.

- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- D. Perform work using competent and properly equipped personnel.
- E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.
- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
 - 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
 - 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
 - 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.02 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptance of project conditions and requirements.

3.03 PREPARATION

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.

- D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.04 INSULATION AND COVER BOARD INSTALLATION

- A. Install insulation in configuration and with attachment method[s] specified in Section 07 2100 - Thermal Insulation.
- B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- C. Lay roof insulation in courses parallel to roof edges.
- D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch.

3.05 SINGLE-PLY MEMBRANE INSTALLATION

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Install membrane adhered to the substrate, with edge securement as specified.
- E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
 - 1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
 - 2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.06 FLASHING AND ACCESSORIES INSTALLATION

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
 - 1. Follow roofing manufacturer's instructions.
 - 2. Remove protective plastic surface film immediately before installation.
 - 3. Install water block sealant under the membrane anchorage leg.
 - 4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.

5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.

3.07 FIELD QUALITY CONTROL

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).
- B. Perform all corrections necessary for issuance of warranty.

3.08 CLEANING

- A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.09 PROTECTION

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

ETHYLENE-PROPYLENE-DIENE-
MONOMER ROOFING (EPDM)
07 5323 - 8

SECTION 07 5400 - THERMOPLASTIC MEMBRANE ROOFING

PART 1. GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. WP-6: Adhered system with thermoplastic roofing membrane.
- B. Vapor retarder.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers and curbs.
- B. Section 06 1000 - Rough Carpentry: Wood cant strips.
- C. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings and reglets.
- D. Section 07 7100 - Roof Specialties: Prefabricated roofing expansion joint flashing.
- E. Section 07 7200 - Roof Accessories: Roof-mounted units; prefabricated curbs.

1.04 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2014.
- D. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2013.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.
- G. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.
- H. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.06 SUBMITTALS

- A. See DDC General Conditions, for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- D. Specimen Warranty: For approval.
- E. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout.
- F. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- H. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- I. Warranty:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in City of New York's name and registered with manufacturer.
 - 2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual.
- B. Manufacturer Qualifications:
 - 1. 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. 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.
 - 2. Installer shall have current approval, license, or authorization as applicator by the manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.

1.09 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.10 WARRANTY

- A. See DDC General Conditions, for additional warranty requirements.
- B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 5 years after installation.
- C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 - 1. Warranty Term: 20 years.
 - 2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Thermoplastic Polyolefin Membrane Materials:
 - 1. Carlisle Roofing Systems, Inc; Sure-Weld TPO: www.carlisle-syntec.com.
 - 2. Firestone Building Products, LLC; UltraPly TPO: www.firestonebpco.com.
 - 3. GAF; EverGuard TPO: www.gaf.com.

2.02 ROOFING - UNBALLASTED APPLICATIONS

- A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation.
- B. VOC content of roof coatings, thermoplastic coatings or waterproofing sealers shall not exceed 550 grams per liter per NYC EPP, 2012.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane:
 - 1. Material: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M.
 - 2. Reinforcing: Internal fabric.
 - 3. Thickness: 0.060 inch, minimum.
 - 4. Sheet Width: Factory fabricated into largest sheets possible.
 - 5. Solar Reflectance: 0.75, minimum, initial, and 0.65, minimum, 3-year, certified by Cool Roof Rating Council.
 - 6. Color: White.
 - 7. TPO Membrane shall be Energy Star labeled per NYC EPP, 2012
 - 8. Recovered Post-Consumer Content: 100%
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Vapor Retarder: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.
 - 1. Fire-retardant adhesive.
- D. Flexible Flashing Material: Same material as membrane.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Coverboard: Cement roof board, complying with ASTM C1325.

2.05 INSULATION

- A. Extruded Polystyrene (XPS) Board Insulation: Extruded polystyrene board with natural skin surface, drainage channels one face, and with the following characteristics:
 - 1. Type: ASTM C578, Type IV.

2.06 ACCESSORIES

- A. Roofing Expansion Joint Flashing: Sheet butyl.
- B. Cant Strips: Wood, pressure preservative treated; as specified in Section 06 1000.
- C. Membrane Adhesive: As recommended by membrane manufacturer.
- D. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- E. Insulation Adhesive: As recommended by insulation manufacturer.
- F. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.
- G. Sealants: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.02 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.03 CONCRETE DECK PREPARATION

- A. Verify adjacent precast concrete roof members do not vary more than 1/4 inch in height. Verify grout keys are filled flush.
- B. Fill surface honeycomb and variations with latex filler.
- C. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.04 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE

- A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
 - 1. Extend vapor retarder under cant strips and blocking to deck edge.
 - 2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.
- B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

- C. Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.
- D. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
- E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- F. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- G. Do not apply more insulation than can be covered with membrane in same day.

3.05 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate per membrane manufacturer's instructions. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by heat welding, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Install roofing expansion joints as required. Make joints watertight.
- H. Coordinate installation of roof drains and sumps and related flashings.

3.06 FIELD QUALITY CONTROL

- A. See DDC General Conditions for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

3.07 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.

3.08 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

THERMOPLASTIC MEMBRANE
ROOFING
07 5400 - 8

SECTION 07 5563 - GREEN ROOF ASSEMBLY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 GENERAL REQUIREMENTS

- A. The General Conditions, the Supplementary Conditions, the Instructions to Bidders and Division One General Requirements shall be read in conjunction with and govern this section.
- B. The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete work of any trade. The Contractor is solely responsible to make clear to the Subcontractors the extent of their work.

1.03 SECTION INCLUDES

- A. Extensive Green Roof System RF-1.
- B. Concrete Pavers RF-2.
- C. Gravel Ballast RF-3.

1.04 VEGETATIVE ROOF ASSEMBLY DESCRIPTIONS

- A. Vegetative Assembly Design & Performance
 - 1. The vegetative roof assembly shall consist of minimum 4 inches (refer to dead load ballast requirements of thermal barrier) of growing media installed over a prefabricated composite drainage and water retention board with laminated filter fabric and root barrier.
 - 2. The vegetative roof assembly shall be designed for the climate conditions of the project site with supplemental irrigation measure as established by the landscape professional.
 - 3. This vegetative roof assembly shall be compatible with pedestrian access and integration with patio and walkway elements.
 - 4. The vegetative roof assembly shall:
 - a. Support a perennial vegetative ground cover,
 - b. Provide efficient drainage of moisture in excess of that required for the growth of vegetation,
 - c. Protect the roof waterproofing materials from damage caused by physical abuse and temperature fluctuations.
- B. Extensive Vegetative Roof Assembly: Supply labor, materials, plant, tools and equipment to complete the Work as shown on the Drawings and as specified herein including, but not limited to the following:
 - 1. Concrete deck, plywood or sheathing board mechanically fastened to metal deck,

2. Primer & 2 ply Hot Applied Rubberized Asphalt Waterproofing Membrane and Protection Course,
3. Electric Field Vector Mapping (EFVM) Quality Assurance Program,
4. Root Barrier, Rigid Insulation, Water Retention / Drainage Board and Filter Fabric,
5. Extensive Growing Media Blend (3 - 6 inches) and Plant Material.

1.05 RELATED WORK

- A. Section 03 3000 - Cast-in-Place Concrete
- B. Section 06 1000 - Rough Carpentry
- C. Section 07 6200 - Sheet Metal Flashing and Trim
- D. Section 07 9005 - Joint Sealers
- E. Section 07 2100 - Thermal Insulation
- F. Section 07 7200 - Roof Accessories

1.06 REFERENCES

- A. The following standards are applicable to this section:
 1. ASTM D41: Asphalt Primer used in Roofing, Dampproofing, and Waterproofing;
 2. ASTM D92: Standard Test Method for Flash and Fire Points by Cleveland Open Cup;
 3. ASTM D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension;
 4. ASTM D1191: Standard Test Method for Concrete Joint Sealants;
 5. ASTM D3407: Standard Test Method for Joint Sealants, Hot Poured, for Concrete and Asphalt Pavements;
 6. ASTM E96: Water Vapor Transmission of Materials;
 7. ASTM E 2397: Standard Practice for Determination of Dead Loads and Live Loads associated with Green Roof Systems;
 8. ASTM E 2398: Standard Test Method for Water Capture and Media Retention of Geocomposite Drain Layers for Green Roof Systems;
 9. ASTM E 2399: Standard Test Method for Maximum media Density for Dead Load Analysis of Green Roof Systems;
 10. ASTM E 2400: Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems;
 11. ASTM D5147: Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material;
 12. ASTM D5385: Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes;
 13. ASTM D6164: Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements;
 14. CGSB 37-GP50M: Hot Applied, Rubberized Asphalt for Roofing and Waterproofing;
 15. UL Inc.: Class A Classification for use in Ballasted Systems.
 16. ANSI/SPRI VF- 1 External Fire Design Standard for Vegetative Roofs.
 17. ANSI/SPRI RP-14 Wind Design Standard for Vegetative Roofing Systems.
 18. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.07 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 8113, Sustainable Design Requirements.
- C. Submit a document stating that the applicator of the primary membranes specified in this Section is authorized by the waterproofing manufacturer for the execution of the Work.
- D. Submit a document stating that the vegetative roof assembly installer is properly trained by the waterproofing manufacturer for the execution of the work.
- E. Submit references that the vegetative roof assembly installer has successfully completed projects of similar scope and nature.
- F. Submit the Waterproofing Manufacturers' standard details for the hot fluid applied roofing membrane system and vegetative roof assembly.
- G. Samples:
 - 1. Provide 4" X 4" square samples for each of the following:
 - a. Root Barrier, Prefabricated composite drainage and water retention board with laminated filter fabric,
 - b. Protection course,
 - c. Vegetative roof assembly components including insulation, fabrics, curbs, pavers,
 - 2. Provide 6-ounce sample of growing media blend.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. 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. 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.
 - 2. Installer shall have current approval, license, or authorization as applicator by the manufacturer.
- C. Single-Source Responsibility:
 - 1. Obtain waterproofing and vegetative roof assembly components and materials from a single manufacturer regularly engaged in the manufacturing and supply of the specified products.
 - 2. Contractor to verify product compliance with federal, state and local regulations controlling use of Volatile Organic Compounds (VOC).
- D. Waterproofing Applicator:
 - 1. Perform work in accordance with manufacturers written instructions and this specification.
 - 2. Maintain one copy of Waterproofing Manufacturers' technical data sheets on site.

3. At the beginning of the Work and at all times during the execution of the work, allow access to site by the Waterproofing Manufacturers' representative.
 4. Mock-Up: Where directed, construct typical assembly mock-up incorporating substrate, primer and waterproofing membrane system. Allow 24 hours for inspection of mock-up before proceeding. Mock-up may remain as part of the work.
- E. Vegetative Roof Assembly Installer
1. Perform Work in accordance with manufacturers written instructions for the Vegetative Roof Assembly and this specification.
 2. At the beginning of the Work and until the 24 month establishment period has elapsed, allow access to site by the representatives of the vegetative roof assembly provider.
- F. Waterproofing components used in this section shall be produced and/or supplied by the Waterproofing Manufacturer including the primary membrane, primers, flashings and protection course.
- G. Ensure continuity of the waterproofing membrane throughout the scope of this section.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
1. Materials shall be delivered to the jobsite in undamaged and clearly marked containers indicating the name of manufacturer and product.
 2. Plant Materials shall be delivered to the jobsite on undamaged and clearly marked pallets including the plant list.
- B. Storage of Materials:
1. Hot rubberized asphalt should be stored in closed containers and protected from the weather.
 2. Store primer at temperatures of 40 degrees F and above to facilitate handling. Keep solvent away from open flame or excessive heat.
 3. Store roll materials on end.
 4. Plant materials must be protected and stored in the shade, covered with wet burlap or in refrigerated trucks and maintained at a cool temperature.
- C. Handling of Materials:
1. Primer contains solvent and is flammable. Do not use near open flame.
 2. Plant material shall be un-loaded from shipping containers as soon as possible. All plants or pots shall be watered as they arrive on site.
 3. Pallets shall be shrink-wrapped and secured prior to being lifted onto roof.

1.10 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: No installation Work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.
- B. Store rolls in heated location until needed on the roof.
- C. Minimum working temperatures shall take into consideration a factor for wind chill. Application temperature shall be considered to be the temperature minus half of the wind speed as recommended by the National Roofing Contractors Association [NRCA].
- D. Protection:

1. Temporary protection of the installed membrane shall be provided to prevent mechanical damage or damage from spillage of oil or solvents until such time as permanent protection is provided;
 2. Do not permit traffic of any kind over unprotected waterproof membranes. Apply protection board or protection course as soon as possible after installation of membrane.
- E. Ensure substrate preparation work is complete prior to installing waterproofing membrane.
- F. Provide procedures for:
1. Ballasting insulation and other system components;
 2. Protecting the finished waterproofing membrane system from physical damage;
 3. Controlling access to the finished waterproofing membrane.

1.11 MANUFACTURER'S PROJECT ACCEPTANCE

- A. Prior to contracting, the prime roofing/waterproofing contractor and vegetative roof assembly installer must receive a letter from the Membrane Manufacturer stating acceptance of the project specifications and the terms of the specified warranty.

1.12 PRECONSTRUCTION CONFERENCE

- A. Meet with City of New York, Commissioner, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
- B. Coordination of required flood testing or installation electric field vector mapping system,
- C. Placement of insulation and temporary ballast,
- D. Coordination of the placement of vegetative roof components and plant materials, and
- E. Coordination of job site visits by membrane manufacture and verify status of warranty documents.

1.13 WATERPROOFING MEMBRANE WARRANTY

- A. Manufacturer's Single Source Warranty:
1. Waterproofing contractor warrants the waterproofing membrane and membrane flashings for leak coverage for two (2) years.
 2. Waterproofing membrane manufacturer warrants the membrane and membrane flashings for leak coverage as a result of faulty materials or workmanship for a period of 20 years from the date of substantial completion. The remedy is to provide replacement materials and labor necessary to repair the membrane to a watertight condition.
 3. Waterproofing membrane manufacturer hereby warrants:
 - a. The insulation shall retain 80 percent of its thermal value for the duration of the insulation warranty.
 - 1) Pavers shall not split, crack or disintegrate prematurely due to freeze-thaw cycling for the duration of the paver warranty.
 - 2) The vegetation shall have a two (2) year thrive coverage of minimum 50 percent thrive coverage after the first year and minimum 80 percent thrive coverage after the second year.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Hot Rubberized Asphalt Roofing:
1. American Hydrotech, Inc: www.hydrotechusa.com.
 2. GAF: www.gaf.com.
 3. Carlisle Coatings and Waterproofing Incorporated: www.carlisle.com.
 4. Henry Company: www.henry.com.
 5. or approved equal.

2.02 MATERIALS

- A. MEMBRANE
1. Hot Fluid-Applied, Reinforced Rubberized-Asphalt Waterproofing Membrane: Single component; 100 percent solids; hot fluid-applied, rubberized asphalt.
- B. NYC EPP, 2012
1. Energy Star: membrane shall be Energy Star labeled per NYC EPP.
 2. Recovered Post-Consumer Content: 25%
 3. VOC content of roof coatings, thermoplastic rubber coatings or waterproofing sealers shall not exceed 550 grams per liter.
 4. VOC content of Bituminous Roof Coatings shall not exceed 300 grams per liter.
 5. VOC content of Bituminous Roof Primers shall not exceed 350 grams per liter.
- C. FLASHING SHEET MATERIALS
1. Elastomeric Flashing Sheet: 50-mil- minimum, uncured sheet neoprene as follows:
 - a. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
 - b. Elongation: 300 percent minimum; ASTM D 412.
 - c. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
 - d. Brittleness: Does not break at minus 30 deg F; ASTM D 2137.

2.03 AUXILIARY MATERIALS

- A. Deck Sheathing: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch thick.
- B. Primer: ASTM D 41, asphaltic primer.
- C. Elastomeric Sheet: 50-mil- minimum, uncured sheet neoprene as follows:
1. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
 2. Elongation: 300 percent minimum; ASTM D 412.
 3. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
 4. Brittleness: Does not break at minus 30 deg F; ASTM D 2137.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum termination bars; approximately 1 by 1/8 inch thick; with anchors.

- E. Sealants and Accessories: Manufacturer's recommended sealants and accessories.
- F. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.
- G. Separation/Protection Course: One of the following types as standard with the manufacturer"
 - 1. Manufacturer's standard, 80- to 90-mil- thick, fiberglass-reinforced rubberized asphalt or modified bituminous sheet.
 - 2. Semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows ASTM D 6506:
 - a. Thickness: 1/8 inch, nominal, for vertical applications; 1/4 inch, nominal, elsewhere.

2.04 ELECTRIC FIELD VECTOR MAPPING QUALITY ASSURANCE COMPONENTS

- A. Provide electrical wiring, and other components necessary for a testing agency to perform integrity testing of waterproofing membrane.

2.05 ROOT BARRIER

- A. Root Barrier: 20 mil minimum thickness membrane made from two layers of polyethylene laminated to a reinforced multifilament grid.

2.06 EXTRUDED POLYSTYRENE INSULATION

- A. Unfaced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, 60-psi minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. DiversiFoam Products; CertiFoam 60.
 - b. Dow Chemical Company; STYROFOAM BRAND PLAZAMATE INSULATION.
 - c. Owens Corning; Foamular 604 RB.

2.07 WATER RETENTION / DRAINAGE BOARD

- A. Composite drainage system consisting of a three-dimensional, crush-proof, drainage core and a filter fabric

2.08 BALLAST AND PAVERS

- A. Ballast, RF-3, shall be crushed stone ballast (washed, crushed or rounded), 1/2 inch - 1 1/2 inches in diameter at not less than 1200 pounds per 100 square feet, or as indicated by insulation manufacturer or project specification.
- B. Precast Concrete Pavers, RF-2, manufactured by Hanover, Wausau or Westile as selected by Commissioner.
- C. Pedestal supports for pavers shall be in accordance with the paver manufacturers' recommendations.

2.09 VEGETATIVE ROOF GROWING MEDIA AND VEGETATION

A. GROWING MEDIA

1. Design and blend growing media appropriate to meet vegetative roof assembly and plant material growth.

B. VEGETATION

1. Vegetation shall be selected by landscape professional.
2. Refer to 32 9300 - Plant Materials and Planting for specific species of vegetation.

2.10 ACCESSORIES

A. DRAIN INSPECTION CHAMBERS

1. Aluminum and stainless steel over drain chambers perforated to allow water flow as shown on plans and details.

B. METAL EDGE RESTRAINT

1. Extruded aluminum edging perforated to allow water flow as shown on plans and details.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Acceptable substrates are cast-in-place and precast concrete and plywood. Metal pan decks to which concrete is poured must be venting type.
- B. Verify that surfaces and conditions are ready to accept the work of this section. The roofing contractor shall not proceed with the installation of the roof membrane assembly until all roof defects have been corrected.

3.02 PREPARATION

- A. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar, frost or other contaminants. Fill spalled areas in substrate to provide an even plane and remove scaling or latent concrete. Remove curing compounds or any foreign matter detrimental to the adhesion of the primary waterproofing membrane or membrane flashings.
- B. New concrete should be cured for a minimum of fourteen (14) days and must be dry before waterproofing membranes are applied. Concrete in vented metal pan decks must be cured a minimum of sixty (60) days.
- C. Concrete shall have a wood float finish. Steel float finishes are too smooth and compromise the adhesion of the waterproofing system. Decks with a steel float finish must be sandblasted or equivalent prior to the application of the waterproofing system.
- D. Lightweight concrete is an acceptable substrate provided:
1. The compressive strength of the concrete topping is minimum 2500 psi at 28 days.
 2. The density of the concrete topping is minimum 115 pcf

3. The deck is vented from the underside to facilitate drying. For composite steel deck construction, allow concrete to cure sixty (60) days.
 4. A cure period of minimum twenty-eight (28) days is required prior to application of the membrane system, except as described above for composite decks.
 5. The membrane is applied in a two-coat fabric reinforced system. Pin-holing of the membrane is expected to occur in the first coat over lightweight structural concrete.
- E. Prefabricated expansion joint assemblies should be in place prior to the application of the primary waterproofing assembly.
- F. Substrate Preparation for Plywood & Gypsum Sheathing
1. Secure sheathing mechanically with self-tapping, non-corroding screws and 3 inches diameter metal plates spaced a maximum of 24 inches in either direction and to only the top flanges of the metal deck.
 2. Lay sheathing with tightly butted joints at right angles to flute direction. Joints occurring along the widths of the sheathing must be continuously supported on a top flange of the metal deck.
 3. Check tightness of joints and flatness of wood decking prior to proceeding with application of membrane. Ensure sheathing is continuously supported on framing.
 4. The joints between boards of plywood decks shall be taped with a self-adhered crack treatment membrane prior to the application of protection sheet. Loose lay mop grade protection sheet over plywood sheathing and back nail; provide 6 inches end laps and 2 1/2 inches side laps. Stagger end laps.
 5. The contractor shall review all surfaces to receive the membrane and report any discrepancies prior to installing the waterproofing system.
- G. Metal Deck with roof substrate board
1. Roof substrate board shall be glass mat faced gypsum panels attached to minimum 22 gauge steel decking with adequate structural support.
 - a. Minimum 5/8 inch thick substrate board shall be used directly to metal deck.
 - b. Minimum 1/2 inch thick substrate board shall be used over insulation.
 2. Flat fill and tapered roof insulation shall be installed in accordance with layout indicated on shop drawings and insulation board manufacturer's minimum requirements.
 3. Adequate number and type of fasteners and plates shall be used to comply with roof substrate and insulation board manufacturer's minimum requirements and applicable codes and to maintain structural integrity.
 - a. Minimum of 10 fasteners and plates per full-size roof board shall be used.
 4. Appropriate roof adhesive shall be used in accordance with adhesive manufacturer requirements to comply with applicable codes and maintain structural integrity.
 - a. Size and spacing of adhesive beads shall be as required by adhesive manufacturer.
 5. Roof substrate boards shall be installed such that all edge and end joints are supported by metal deck ribs and/or appropriate blocking.
 6. Roof substrate board end joints of adjacent lengths shall be staggered.
 7. Where required, a suitable vapor barrier membrane, as determined by the Commissioner or engineer, shall be applied to the metal decking prior to installation of the roof substrate board.
 8. Roof substrate board edges and ends shall be butt loosely in typical installations. Long, uninterrupted runs (greater than 200 feet) of roof substrate board may require slight gapping due to higher temperature gain. Gapping shall not exceed 3/16 inch and all such gaps shall be filled flush with the surface of the roof board with an appropriate sealant.
 9. Roof substrate board shall be cut to size using a sharp utility knife and straightedge. The surface of the roof substrate board shall be scored with the utility knife and the board bent up sharply

towards the score cut. A keyhole-type drywall saw shall be used for penetration cutouts and radii. A low rpm circular saw shall be used for 5/8 inch thick roof board.

- H. Substrate cleaning
 - 1. Thoroughly sweep the substrate which is to receive the roof membrane.
 - 2. Substrate shall also be blown clean using an air compressor to remove any remaining loose debris.

3.03 INSTALLATION OF WATERPROOFING MEMBRANE

- A. Primer
 - 1. Apply primer as recommended by manufacturer and allow drying prior to the application of the primary waterproofing membrane or membrane flashings.
- B. Joint Treatment for Precast Concrete Deck
 - 1. Reinforce joints along length and width of units with a strip of 12 inches wide polyester fabric set in an 18 inch wide, 1/8 inch thick coat of membrane.
- C. Deck to Vertical Junctures
 - 1. Apply hot rubberized asphalt membrane to provide a thickness of approximately 1/8 inch to the vertical faces and a minimum of 4 inches out onto the horizontal surface.
 - 2. Embed flashing sheet in the hot rubberized asphalt membrane, avoiding any wrinkles or fish mouths, extending a minimum of 3 inches out onto the horizontal surface.
 - 3. Mechanically attach the flashing sheet to vertical surfaces with metal securement bar where height of flashing exceeds 12 inches. Lap flashing sheet minimum 3 inches on ends.
 - 4. At monolithic pour, use fabric reinforcement as option to flashing sheet.
- D. Expansion Joints (Neoprene)
 - 1. Expansion joint membrane can be applied in a bed of primary waterproofing membrane or adhered to substrate with expansion joint adhesive. Place expansion joint membrane into expansion joint adhesive as recommended by manufacturers' written instructions.
 - 2. Loop expansion joint membrane down into expansion joint, embedded into a 1/8 inch thick layer of hot rubberized asphalt membrane. Ensure that the depth of loop is a minimum 1-1/2 inch.
 - 3. Extend expansion joint membrane minimum of 3 inch on each side of joint. Seal end joints a minimum of 6 inch and seal with a 1/8 inch coat of membrane. Fill loop with membrane as required.
 - 4. Secure top of expansion joint membrane with continuous fixing bar at vertical wall locations.
- E. Crack Treatment
 - 1. Seal cracks and joints 1/16 inch to 1/8 inch in width with a 12 inch wide, 1/8 inch thick coat of hot rubberized asphalt membrane and a 6 inch wide strip of fabric reinforcement, centered over joint.
 - 2. Seal cracks and joints 1/8 inch to 1/4 inch in width with a 12 inch wide, 1/8 inch thick coat of hot rubberized asphalt membrane and a 6 inch wide strip of crack treatment or expansion joint membrane, centered over joint.
- F. Membrane Flashing At Drains
 - 1. Coat areas around the drains with hot rubberized asphalt membrane at a thickness of 1/8 inch.
 - 2. Place flashing sheet over the coated drain flange and extending a minimum 6 inches around the flange.
 - 3. Apply a second coat of hot rubberized asphalt membrane over the flashing sheet at a thickness of 1/8 inch.

4. Apply clamping ring exerting sufficient pressure to affect a seal between clamping ring and membrane. Temporarily block all drains during the application of ballast, or other materials that might block the drains. Remove blocking when work is not in progress and upon completion.
- G. Membrane Flashing At Protrusions
1. At mechanical vent, protrusions and pipe penetrations provide flashing sheet set into 1/8 inch layer of hot rubberized asphalt membrane. Overcoat and seal with membrane. Install clamps and seal leading edge with terminations sealant.
 2. At pitch pockets, place pan on top of a 1/8 inch layer of membrane and attach into roof deck. Set flashing sheet into 1/8 inch hot rubberized asphalt membrane over top of flange. Fill pitch pocket with rubberized asphalt or rubber asphalt sealer in order to shed water.
- H. Non-Exposed Membrane Flashing At Vertical Junctures (Self-Adhering Membrane):
1. Apply self-adhering waterproofing membrane to prepared substrate in lengths of 6 feet or less.
 2. Horizontal to vertical inside corner transition areas are to be pre-treated with a fillet bead of termination sealant extending 3/4 inch vertically and horizontally from the corner. Apply a minimum 10 inch wide strip of waterproofing membrane centred at the joint.
 3. All outside corners are to be pre-treated with a minimum 10 inch strip of waterproofing membrane centred at the joint.
 4. Where three or more planes come into contact reinforce with cut sections of waterproofing membrane reinforcing sheet as per manufacturer's instructions.
 5. Provide 2-1/2 inch laps at both sides and ends. Position for alignment and remove protective film. Press firmly into place. Promptly roll all laps with a counter top roller to affect seal. If more than one length is required on a vertical surface, apply in a shingle
 6. Terminate membrane using termination sealant and counter flashing as indicated.
 7. All laps within 12 inches of a 90 degree change in plane are to be sealed with termination sealant.
- I. Application of Hot Rubberized Asphalt Membrane:
1. Ensure deck is ready to receive hot applied rubberized asphalt membrane. Where torch applied flashing membranes have been used, ensure top polyfilm has been scorched away prior to application of the membrane.
 2. Apply membrane smooth, free from air pockets, wrinkles, or tears and to manufacturer's Instructions. Ensure full bond of membrane to substrate.
 3. Apply first layer of hot rubberized asphalt membrane evenly to a minimum thickness of 90 mils to form a continuous monolithic coating over horizontal and vertical surfaces including previously reinforced areas.
 4. Apply fabric reinforcing sheet and firmly press into first layer of hot membrane. Overlap fabric approximately 1/4 inch ensuring that a layer of membrane is present between overlaps. Apply second layer of membrane over the fabric to a minimum thickness of 1/8 inches (125 mils) providing a total thickness of 215 mils.
- J. Installation of Protection Course
1. Protection course shall be rolled onto hot applied rubberized asphalt membrane while still warm and tacky.
 2. Lap protection course 2 inches on side laps and 6 inches on end laps.
 3. Starting at the low points or drains lay the protection course membrane in full continuous sheets in a shingle pattern. Stager all end laps.
 4. Assure the all other trades and foot traffic remain off completed membrane until after completion of flood test or EFVM testing.

3.04 ELECTRIC FIELD VECTOR MAPPING

- A. EFVM to be completed in conjunction with the completion of waterproofing and prior to placement of root barrier or any other overburden.
- B. International Leak Detection, or approved test provider will need to be contacted several weeks in advance to coordinate schedule.
- C. In the event of a breach of the membrane, repair and retest the system for no less than 24 hours.
- D. Report results of testing to the Commissioner. Remove temporary stops and plugs.
- E. No other Work is to proceed with out prior direction from the Commissioner.

3.05 INSTALLATION OF ROOT BARRIER

- A. Install Root Barrier membrane as directed by landscape professional:
 - 1. The root barrier sheet shall be lapped 24 inches and seal with 1/2" bead of specified termination sealant.
 - 2. Root barrier sheet must extend up vertical surfaces to the upper level of the growing medium and protect the waterproofing membrane.
 - 3. Provide temporary ballasting over root barrier membrane where required until permanent covering material is installed.

3.06 INSTALLATION OF INSULATION

- A. Install insulation loose over the protection course/secondary root barrier, firmly butting each insulation board to surrounding board.
- B. The end joints of the insulation shall be staggered, use full size pieces where possible.
- C. The insulation shall be cut to fit closely to protrusion and obstructions.
- D. Do not lay more insulation than be covered within the same working day.

3.07 INSTALLATION OF WATER RETENTION / DRAINAGE BOARD AND FILTER FABRIC

- A. Install Water Retention/Drainage Board System over insulation as indicated on the drawings.
 - 1. Overlap core flange with core flange of adjacent sheet a minimum of 1 inch. Overlap top layer of filter fabrics a minimum of 2 1/2 inches.
 - 2. Cut core and fabric to fit tightly around penetrations.
 - 3. Extend Root Barrier/Water Retention/Drainage Board up vertical flashing to the intended finish grade of the growing medium.
- B. Installation of Filter Fabric:
 - 1. Install fabric over the Root Barrier/Water Retention/Drainage Board and as indicated on drawings. Overlap edges a minimum 6 inches. Do not use lengths of less than 6 feet.
 - 2. Install, fit and secure filter fabric to prevent growing media from moving passing through, around or over to the surfaces below.

3. Fit sections of filter fabric at penetrations and roof drains, cut to surround the penetration or drain and extend up vertically to the intended finish grade of the growing medium. Slit fabric to fit tightly over penetrations, cut out around roof drains and other openings.
4. Extend fabric up perimeter and vertical surfaces to the intended finish grade of the growing medium and wrap around top edge of Root Barrier/ Water Retention/ Drainage layer where required or as indicated on drawings.
5. Provide temporary ballasting over Filter Fabric as required preventing displacement until permanent covering material installed.

3.08 INSTALLATION OF GROWING MEDIA, PLANT MATERIAL AND VEGETATION FREE ZONES

- A. The contractor shall review the placement of Water Retention/Drainage Board and filter fabric and report any discrepancies prior to the placement of growing media.
- B. Supply and install specified growing media and plant materials as selected and detailed on plant list as per mix design and depths specified.
- C. Installation of media shall be carried out in such a way as to not damage filter fabric and Water Retention/ Drainage Board.
- D. Supply and install vegetation as per drawings and specifications and in accordance with the landscape professional instruction and standard good practices.
- E. Coordinate and schedule placement of curbs details for vegetation free zones around perimeter edges as indicated on drawings.

3.09 INSTALLATION OF GRAVEL BALLAST & CONCRETE PAVERS

- A. Installation of gravel ballast & concrete pavers to be completed after placement of curbs details as indicated on drawings.
- B. Spread gravel ballast uniformly over the installed filter fabric according to insulation manufacturer's recommendations.
- C. Place concrete pavers, where indicated, on pedestals, accurately aligned, and leveled with upper surface of pavers in plane with adjacent units. Cut pavers to fit irregularly shaped areas and around protrusions. Install according to manufacturer's instructions.

3.10 FIELD QUALITY CONTROL

- A. Manufacturer's Supervision:
 1. Field inspection of the works shall be carried out by the membrane and insulation manufacturer's representatives during installation of the work.
- B. Guarantee Service Program
 1. Prime waterproofing installer will be responsible to ensure vegetation is sufficiently watered post installation to assure full plant establishment.

3.11 CLEAN-UP

- A. Promptly as the work proceeds and on completion, clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing work.

- B. Clean to the Commissioner's approval, soiled surfaces, spatters, and damage caused by work of this Section.
- C. Check area drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from the site.

END OF SECTION

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES:

- A. Manufactured Products:
 - 1. Manufactured reglets and counterflashing.
- B. Formed Products:
 - 1. Formed roof drainage sheet metal fabrications.
 - 2. Formed low-slope roof sheet metal fabrications.
 - 3. Formed sheet metal wall copings - MTL-1.
 - 4. Formed equipment support flashing.

1.03 RELATED SECTIONS:

- A. Section 06 1000 - Rough Carpentry: for wood nailers, curbs, and blocking.
- B. Section 07 2500 - Weather Barriers
- C. Section 07 5563 - Green Roof Assembly: for installing sheet metal flashing and trim integral with membrane roofing.
- D. Section 07 7200 - Roof Accessories: for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
- E. Section 08 9100 - Louvers: for installing sheet metal flashing and trim integral with Architectural louver frames.

1.04 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.
- F. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - 1. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft.: 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- D. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 4. Details of termination points and assemblies, including fixed points.
 - 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 - 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 7. Details of special conditions.
 - 8. Details of connections to adjoining work.
 - 9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.
- E. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

- F. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 2 inches long and in required profile. Include fasteners and other exposed accessories.
 - 3. Accessories and Miscellaneous Materials: Full-size Sample.
- G. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.08 PREINSTALLATION CONFERENCE: CONDUCT CONFERENCE AT PROJECT SITE.

- A. Meet with City of New York, Commissioner, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
- B. Review methods and procedures related to sheet metal flashing and trim.
- C. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
- D. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
- E. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.01 NYC EPP 2012

- A. Recovered Materials Content:
 - 1. Steel (BOF):
 - a. Recovered Post-Consumer Content: 16%
 - b. Total Recovered Materials Content: 25 - 30%
 - 2. Steel (EAF):
 - a. Recovered Post-Consumer Content: 67%
 - b. Total Recovered Materials Content: 100%
- B. VOC content of roof coatings, thermoplastic rubber coatings or waterproofing sealers shall not exceed 550 grams per liter.
- C. VOC content of Bituminous Roof Coatings shall not exceed 300 grams per liter.
- D. VOC content of Bituminous Roof Primers shall not exceed 350 grams per liter.

2.02 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Zinc-Coated [Galvanized] Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
 - 2. Surface: Smooth, flat.
 - 3. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4. Color: As selected by Commissioner from manufacturer's full range.
 - 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
 - 1. Finish: 2D (dull, cold rolled).
 - 2. Surface: Smooth, flat.

2.03 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.

- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
 - 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.04 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
 - 2. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.05 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corporation.
 - b. Heckmann Building Products Inc.
 - c. Hickman, W. P. Company.
 - d. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 2. Material: Galvanized steel, 0.022 inch thick.
 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 4. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 5. Finish: Mill.

2.06 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Do not use graphite pencils to mark metal surfaces.

2.07 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.
- B. Splash Pans: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.

2.08 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Furnish with 6-inch- wide, joint cover plates.
 - 1. Joint Style: Butt, with 12-inch- wide, concealed backup plate.
 - 2. Fabricate with scuppers spaced 10 feet apart, of dimensions required with 4-inch- wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - 3. Fabricate from the following materials:
 - a. Galvanized Steel: 0.028 inch thick.
- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Coping Profile: As detailed.
 - 2. Joint Style: Butt, with 12-inch- wide, concealed backup plate.
 - 3. Fabricate from the following materials:
 - a. Stainless Steel: 0.0625 inch thick.
- C. Base Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.
- D. Counterflashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch thick.
- E. Flashing Receivers: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch thick.

- F. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.
- G. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch thick.

2.09 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.03 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel sheet.
 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.04 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant compatible with roofing membrane.
- C. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 - 1. Anchor scupper closure trim flange to exterior wall and solder or seal with elastomeric sealant to scupper.
 - 2. Loosely lock front edge of scupper with conductor head.
 - 3. Solder or seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

3.05 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 16-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 20-inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.06 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.08 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

SHEET METAL FLASHING AND
TRIM
07 6200 - 12

SECTION 07 7100 - ROOF SPECIALTIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Manufactured roof specialties, including vents.
- B. Roof membrane vents.

1.03 RELATED REQUIREMENTS

- A. Section 07 6200 - Sheet Metal Flashing and Trim
- B. Section 07 5563 - Green Roof Assembly

1.04 REFERENCE STANDARDS

- A. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.
- B. SMACNA (ASMM) - Commissionerrural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.

1.05 SUBMITTALS

- A. See DDC General Requirements for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- D. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) details.

PART 2. PRODUCTS

2.01 MANUFACTURERS

- A. Louvered Vents:
1. CopperCraft: www.coppercraft.com.
 2. Vulcan Supply Corp: www.vulcansupply.com.
 3. GAF: www.gaf.com
 4. or approved equal.
- B. Pipe and Penetration Flashings:
1. SBC Industries: www.sbcflashings.com.
 2. Thunderbird Products: www.thunderbirdproducts.com
 3. Menzies Metal Products: www.menzies-metal.com
 4. or approved equal.

2.02 COMPONENTS

- A. Roofing Vents: Formed stainless steel □6 gauge, of watertight construction to permit construction below roof membrane to breathe; with attachment flanges 2 inch wide. .
- B. Pipe and Penetration Flashing: Base of stainless steel, compatible with flat roof systems, and capable of accomodating pipes sized between 0.375 inches and 12 inches.

2.03 ACCESSORIES

- A. Roof Cement: ASTM D4586, Type I.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.

- B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.
- D. Coordinate installation of flashing flanges into reglets .

END OF SECTION

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SECTION 07 7200 - ROOF ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Manufactured curbs, equipment rails, and pedestals.

1.03 RELATED REQUIREMENTS

- A. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
- B. Section 07 7100 - Roof Specialties: Other manufactured roof items.

1.04 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- D. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.
 - 1. Non-penetrating Rooftop Supports: Submit design calculations for loadings and spacings.

PART 2 PRODUCTS

2.01 MANUFACTURED CURBS

- A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
1. AES Industries Inc.: www.aescurb.com.
 2. The Pate Company: www.patecurbs.com.
 3. Roof Products & Systems (RPS) by Commercial Products Group of Hart & Cooley, Inc: www.rpscurbs.com.
 4. or approved equal.
- B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 ; G60 coating designation; 18 gage, 0.048 inch thick.
 2. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches.
 3. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
 4. Provide the layouts and configurations shown on the drawings.
- C. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
 2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
 3. Height Above Finished Roof Surface: 12 inches, minimum.
 4. Height Above Roof Deck: 14 inches, minimum.
- D. Equipment Rails: Two-sided curbs in straight lengths, with top horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of rails.
 2. Height Above Finished Roof Surface: 6 inches, minimum.
 3. Height Above Roof Deck: 14 inches, minimum.
- E. Pipe, Duct, and Conduit Mounting Pedestals: Vertical posts, minimum 8 inches square unless otherwise indicated.
1. Provide sliding channel welded along top edge with adjustable height steel bracket, manufactured to fit item supported.
 2. Height Above Finished Roof Surface: 6 inches, minimum.
 3. Height Above Roof Deck: 14 inches, minimum.

2.02 NON-PENETRATING ROOFTOP ASSEMBLIES

- A. Non-Penetrating Rooftop Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly.
1. Design Loadings and Configurations: As required by applicable codes.

2. Height: Provide minimum clearance of 6 inches under supported items to top of roofing.
 3. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 4. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 5. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
- B. Pipe Supports: Provide attachment fixtures complying with MSS SP-58 and as indicated.
1. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
 2. See relevant piping system specification section for additional requirements.
- C. Non-Penetrating Pedestals: Steel pedestals with square, round, or rectangular bases.
1. Bases: High density polypropylene.
 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 3. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Commissioner of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.

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B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 8410 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum, and [5] the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - 1. Floors.
 - 2. Walls and partitions.

1.03 RELATED REQUIREMENTS:

- A. Section 03 3000 - Cast-in-Place Concrete: for construction of openings in concrete slabs and walls.
- B. Section 03 4100 - Precast Structural Concrete
- C. Section 04 2000 - Unit Masonry
- D. Section 06 1000 - Rough Carpentry
- E. Section 09 2116 - Gypsum Board Assemblies
- F. Section 07 8420 - Fire-Resistive Joint Systems for head of wall fire protection.

1.04 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2012.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- C. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
- D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014.
- E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2013.
- F. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- G. FM 4991 - Approval Standard for Firestop Contractors; Factory Mutual Research Corporation; 2013.

- H. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- I. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.; 2004.
- J. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.05 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 - 3. Fire-resistance-rated floor assemblies.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located outside wall cavities.
 - 2. Penetrations located outside fire-resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire-protection-rated openings.
 - 4. Penetrating items larger than 4 inch diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 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 in width and exposed to possible loading and traffic, provide firestop systems capable of supporting 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.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.

- C. Product Data: For each type of through-penetration firestop system product indicated.
- D. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences 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 system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- E. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the UL in "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with City of New York, Commissioner, Installer, and installers whose work interfaces with or affects through-penetration firestop systems including installers of electrical, mechanical, plumbing and fire protection systems.
 - 2. Review methods and procedures related to through-penetration firestop systems.
 - 3. Examine substrate conditions for compliance with requirements.
 - 4. Review special details, penetrations and equipment and condition of other construction that will affect through-penetration firestop systems.
 - 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project Site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hilti Construction Chemicals, Inc.
 - 2. Nelson Firestop Products.
 - 3. Specified Technologies Inc.
 - 4. 3M Fire Protection Products.
 - 5. Tremco.
 - 6. W. R. Grace.

2.02 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.03 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

- I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.04 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods.

- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces. Remove tape as soon as possible without disturbing firestop system's seal.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 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.

3.04 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.05 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.06 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. Cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

3.07 FIRESTOP SCHEDULE

- A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

PENETRATION DESCRIPTION	UL CLASSIFIED SYSTEM		UL NUMBER	FILL MATERIAL
Firestop Systems with No Penetrating Items	C-AJ-	W-J-	0001-0999	Latex sealant
	C-BJ-	W-L-		Silicone sealant
	F-A-			Mortar
Firestop Systems for Metallic Pipes, Conduit, or Tubing				Intumescent putty
	C-AJ-	F-C-	1001-1999	Latex sealant
	C-BJ-	W-J-		Silicone sealant
	C-BK-	W-K-		Mortar
	F-A-	W-L-		Intumescent putty
	F-B-			
Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing	C-AJ-	F-C-	2001-2999	Latex sealant
	C-BJ-	W-J-		Silicone sealant
	F-A-	W-L-		Intumescent putty
	F-B-			Intumescent wrap strips
				Firestop device
Firestop Systems for Electrical Cables	C-AJ-	F-C-	3001-3999	Latex sealant
	C-BJ-	W-J-		Silicone sealant
	F-A-	W-L-		Intumescent putty
	F-B-			Silicone foam
Firestop Systems for Miscellaneous Electrical Penetrants	C-AJ-		6001-6999	Latex sealant
	F-A-			Intumescent putty
	W-L-			Mortar
Firestop Systems for Miscellaneous Mechanical Penetrations	C-AJ-		7001-7999	Latex sealant
	F-C-			Mortar
	W-J-			
	W-L-			
Firestop Systems for Groupings of Penetrations	C-AJ-	F-C-	8001-8999	Latex sealant
	C-BJ-	W-J-		Mortar
	F-A-	W-L-		Intumescent wrap strips
				Firestop device
				Intumescent composite sheet

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END OF SECTION

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FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
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SECTION 07 8420 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. This Section includes fire-resistive joint systems for the following:
 - 1. Head-of-wall joints.

1.03 RELATED REQUIREMENTS:

- A. Section 03 3000 - Cast-in-Place Concrete: for construction of openings in concrete slabs and walls.
- B. Section 03 4100 - Precast Structural Concrete
- C. Section 04 2000 - Unit Masonry
- D. Section 06 1000 - Rough Carpentry
- E. Section 09 2116 - Gypsum Board Assemblies
- F. Section 07 8410 - THROUGH-PENETRATION FIRESTOP SYSTEMS for systems installed in openings in walls and floors with and without penetrating items.

1.04 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2012.
- B. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
- C. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014.
- D. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a.
- E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2013.
- G. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- H. FM 4991 - Approval Standard for Firestop Contractors; Factory Mutual Research Corporation; 2013.

- I. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- J. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.; 2004.
- K. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.05 PERFORMANCE REQUIREMENTS

- A. General: For joints in the following constructions, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed:
 - 1. Fire-resistance-rated walls, including partitions with fire-protection-rated openings.
- B. Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equaling or exceeding fire-resistance rating of constructions in which joints are located, as determined by UL 2079.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: For each type of product indicated.
- D. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed and relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a perimeter fire containment condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer
- E. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.
- F. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Source Limitations: Obtain fire-resistive joint systems for each kind of joint and construction condition indicated through one source from a single manufacturer.

- C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per ICBO ES AC308 and are qualified for types of joints and joint movement capabilities indicated in a current Evaluation Report by the ICBO Evaluation Service.
 - 3. Fire-resistive joint systems are identical to those tested per UL 2079 and ICBO ES AC308 and are qualified for joint movement capabilities indicated in a current ICBO Evaluation Report by the ICBO Evaluation Service. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - b. Fire-resistive joint systems correspond to those indicated by referencing system designations listed by UL in its "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with City of New York, Commissioner, Installer, and installers whose work interfaces with or affects fire-resistive joint systems.
 - 2. Review methods and procedures related to fire-resistive joint systems.
 - 3. Examine substrate conditions for compliance with requirements.
 - 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fire-resistive joint system products to Project Site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide one of the through-penetration firestop systems of one of the following manufacturers:
1. Hilti Construction Chemicals, Inc.
 2. Isolatek International.
 3. Nelson Firestop Products.
 4. Specified Technologies Inc.
 5. 3M Fire Protection Products.
 6. Tremco.
 7. W. R. Grace.

2.02 FIRE-RESISTIVE JOINT SYSTEMS, GENERAL

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including forming materials that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.

- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system 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 fill materials of fire-resistive joint system from contacting adjoining surfaces. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.03 INSTALLATION

- A. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- B. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.05 FIRE RESISTANT JOINT SCHEDULE

- A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.

JOINT DESCRIPTION	UL SYSTEM	UL NUMBER	JOINT MATERIAL
Head of Wall	HW-D	0001-0999	Latex sealants
		1000-1999	Silicone foam
		2000-2999	Silicone sealants
		3000-3999	
		4000-4999	

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SECTION 07 9005 - JOINT SEALERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.

1.03 RELATED REQUIREMENTS

- A. Section 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- B. Section 07 8410 - Through-Penetration Firestop Systems.
- C. Section 07 8420 - Fire-Resistive Joint Systems
- D. Section 08 8000 - Glazing: Glazing sealants and accessories.
- E. Section 09 2116 - Gypsum Board Assemblies: Acoustic sealant.

1.04 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2010.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- F. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.
- G. Bay Area Air Resources Board Regulation 8, Rule 51, Bay Area Air Quality Management District, www.baaqmd.gov.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

JOINT SEALERS
07 9005 - 1

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Manufacturer's certification of product compliance with sealant VOC criteria per section 2.01 of this specification.
- D. Product Data: Provide data indicating sealant chemical characteristics, Material Safety Data Sheets, performance criteria, substrate preparation, and color availability.
- E. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.07 DELIVERY AND STORAGE

- A. To the extent feasible, do not store sealants or sealant primers with materials that have a high capacity to adsorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpet, textiles, etc.). Do not store sealants or sealant primers in occupied spaces.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and properly trained by the manufacturer.

1.09 MOCK-UP

- A. Provide mock-up of sealant joints in conjunction with window, wall, and air barrier system under provisions of the DDC General Conditions.
- B. Construct mock-up with specified sealant types and with other components noted.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.10 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.11 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Correct defective work within a 2 year period after Date of Substantial Completion.

- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Environmentally-Preferable Product Criteria:
1. VOC Content
 - a. The volatile organic compound (VOC) content of sealants and sealant primers used in interior applications shall not exceed the limits defined in Regulation 8 (Organic Compounds), Rule 51 (Adhesive and Sealant Products) of the Bay Area Air Quality Management District (BAAQMD), of the State of California. The VOC limits defined by BAAQMD (based on 5/2/01 amendments) are as follows. All VOC limits are defined in grams per liter, less exempt compounds.
 2. Sealants:
 - a. Architectural: 250 grams/liter
 3. Sealant Primers:
 - a. Architectural (Non-porous installation): 250 grams/liter
 - b. Architectural (Porous installation): 775 grams/liter
 4. Sealants, primers, and cleaners required for sealant installation must also comply with all local regulations controlling VOC content.

2.02 MANUFACTURERS

- A. Gunnable and Pourable Sealants:
1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 2. Dow Corning Corporation: www.dowcorning.com.
 3. Hilti, Inc: www.us.hilti.com.
 4. Tremco Global Sealants: www.tremcosealants.com.
 5. W.R. Meadows, Inc: www.wrmeadows.com.
 6. or approved equal.
- B. Preformed Compressible Foam Sealers:
1. EMSEAL Joint Systems, Ltd: www.emseal.com.
 2. Dayton Superior Corporation: www.daytonsuperior.com.
 3. Tremco Global Sealants: www.tremcosealants.com.
 4. or approved equal.

2.03 SEALANTS

- A. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
1. Color: Match adjacent finished surfaces.
 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.

- b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- B. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
- 1. Color: Black.
 - 2. Size as required to provide watertight seal when installed.
 - 3. Provide product recommended by manufacturer for traffic-bearing use.
 - 4. Applications: Use for:
 - a. Exterior wall expansion joints.
 - b. Parking deck joints.
- C. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
- 1. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
 - b. Concealed sealant bead in siding overlaps.
- D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
- 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- E. Bathtub/Tile Sealant: white silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
- 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - 1) Color: white
 - b. Joints between kitchen and bath countertops and wall surfaces.
 - 1) Color: Match counter top.
- F. AC-2: Acoustical Sealant for Concealed Locations:
- 1. Composition: Permanently tacky non-hardening butyl sealant.
 - 2. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
 - 3. Products:
 - a. Bostik Inc: www.bostik-us.com.
 - b. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - c. Tremco Global Sealants: www.tremcosealants.com.
 - d. Hilti, Inc.: www.us.hilti.com.
 - e. or approved equal.
- G. Polyurea Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
- 1. Composition: Single or multi-part, 100 percent solids by weight.
 - 2. Hardness: 75, minimum, after 7 days, when tested in accordance with ASTM D2240 Shore A.
 - 3. Color: Concrete gray.
 - 4. Joint Width, Minimum: 1/8 inch.

5. Joint Width, Maximum: 3/4 inch.
6. Joint Depth: Provide product suitable for joints from 1/8 inch to 1-1/2 inches in depth excluding space for backer rod.
7. Applications: Use for:
 - a. Control joints in concrete slabs and floors not filled with filler placed in form.
 - b. Construction joints in concrete slabs and floors.
8. Products:
 - a. Adhesives Technology Corporation; Crackbond JF-311: www.atc.ws.
 - b. ARDEX Americas; ARDISEAL RAPID PLUS: www.ardexamericas.com.
 - c. Nox-Crete; DynaFlex JF-85: www.nox-crete.com
 - d. or approved equal.
- H. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
 1. Approved by manufacturer for wide joints up to 1-1/2 inches.
 2. Color: Match adjacent finished surfaces.
 3. Applications: Use for:
 - a. Expansion joints in floors.
- I. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
 1. Color: Gray.
 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.

2.04 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.

- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.
- E. Exposed Concrete Floor Joints: Test joint filler in inconspicuous area of floor slab. Verify specified product does not stain or discolor slab.

3.03 INSTALLATION

- A. Comply, at minimum, with sealant and sealant primer manufacturer recommendations for space ventilation during and after installation. Where feasible, the following ventilation conditions shall be maintained during the sealant/sealant primer curing period or for 72 hours after installation:
 - 1. Supply 100% outside air 24 hours a day.
 - 2. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%.
 - 3. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in item 2 above.
- B. To the extent practical, allow sealant and sealant primer installations to cure prior to the installation of materials that adsorb VOCs. Materials that adsorb VOCs include carpets, textiles, unprimed gwb, and acoustical ceiling panels.
- C. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- D. Perform installation in accordance with ASTM C1193.
- E. Perform acoustical sealant application work in accordance with ASTM C919.
- F. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- G. Install bond breaker where joint backing is not used.
- H. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- I. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- J. Tool joints concave.
- K. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
- L. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

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ISSUE DATE - 10/12/2015

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Fire-rated steel doors and frames.
- D. Thermally insulated steel doors.
- E. Steel glazing frames.

1.03 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9000 - Painting and Coating

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- F. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.

- G. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014. [ANSI/BHMA A156.115]
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 [ANSI].
- I. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Commercial Metal Manufacturers; 2007.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- K. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- L. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- M. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.
- N. New York City Energy Conservation Code, 2014.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- D. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Doors and Frames:
1. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
 2. De La Fontaine Inc: www.delafontaine.com.
 3. Republic Doors: www.republicdoor.com.
 4. Steelcraft, an Allegion brand: www.allegion.com/us.
 5. or approved equal.

2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 2. Door Top Closures: Flush with top of faces and edges.
 3. Door Edge Profile: Beveled on both edges.
 4. Door Texture: Smooth faces.
 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
 6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 7. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

- A. Exterior Doors:
1. Exterior Doors shall be defined as all doors between fully or partially conditioned spaces and the exterior and also those between fully and partially conditioned spaces.
 2. Grade: ANSI/SKI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 3. Core: Mineral board.
 4. Thickness: 1-3/4 inch.
 5. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 6. Insulating Value: U-value of 0.50, when tested in accordance with ASTM C1363.
 7. Exterior doors shall have a maximum air infiltration of 0.20 cfm/sf per New York City Energy Conservation Code, 2014.
 8. Weatherstripping: Separate, see Section 08 7100.

- B. Interior Doors, Non-Fire-Rated:
 - 1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 - 2. Core: Kraftpaper honeycomb.
 - 3. Thickness: 1-3/4 inch.
- C. Interior Doors, Fire-Rated:
 - 1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 - 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
 - a. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
 - b. Attach fire rating label to each fire rated unit.
 - 3. Core: Mineral board.
 - 4. Thickness: 1-3/4 inch.
- D. Panels: Same construction, performance, and finish as doors.

2.04 STEEL FRAMES

- A. General:
 - 1. Comply with the requirements of grade specified for corresponding door.
 - a. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch, minimum thickness.
 - 2. Finish: Same as for door.
 - 3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
 - 4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
 - 5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- B. Exterior Door Frames: Fully welded.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 - 2. Thermal Break: Provide thermally broken frames with an integral positive thermal break of low conductive material. Do not grout exterior hollow metal door frames.
 - 3. Insulate exterior door frames with foamed-in-place open cell polyurethane.
 - 4. Grout only fire rated frames.
 - 5. Weatherstripping: Separate, see Section 08 7100.
- C. Interior Door Frames, Non-Fire-Rated: Knockdown type.
- D. Interior Door Frames, Fire-Rated: Knockdown type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Fire rated frames to be fully grouted
- E. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 ACCESSORY MATERIALS

- A. Glazing: As specified in Section 08 8000, factory installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Astragals for Double Doors: Specified in Section 08 7100.
 - 1. Exterior Doors: Steel, Z-shaped.
 - 2. Fire-Rated Doors: Steel, shape as required to accomplish fire rating.
- D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- E. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
- F. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- G. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.

- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Do not grout thermally broken exterior frames.
- F. Coordinate installation of hardware.
- G. Coordinate installation of glazing.
- H. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 1416 - FLUSH WOOD DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 7100 - Door Hardware.
- C. Section 08 8000 - Glazing.
- D. Section 09 9000 - Painting and Coating: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI [AWS] - Architectural Woodwork Standards; 2009.
- B. ITS [DIR] - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2012.
- E. UL [BMD] - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- F. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- G. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- D. Adhesives: For each adhesive used, documentation indicating that the adhesive contains no urea formaldehyde.
- E. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

1. Provide the information required by AWI/AWMAC/WI (AWS).
- F. Specimen warranty.
- G. Samples: Submit two samples of door construction, 12 x12 inch in size cut from top corner of door.
- H. Samples: Submit two samples of door veneer, 12 x 12 inch in size illustrating wood grain, stain color, and sheen.
- I. Manufacturer's Installation Instructions: Indicate special installation instructions.
- J. Warranty, executed in City of New York's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for 2 years.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 1. Eggers Industries: www.eggersindustries.com.
 2. Graham Wood Doors: www.grahamdoors.com.
 3. Marshfield DoorSystems, Inc: www.marshfielddoors.com.
 4. Or approved equal.

2.02 DOORS

- A. All Doors: See drawings for locations and additional requirements.
 - 1. Quality Level: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS).
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at all locations.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 - 3. Wood veneer facing with factory transparent finish where indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Urea Formaldehyde: not permitted.
 - 1. Composite Wood products may not contain added urea formaldehyde.
- B. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- C. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Natural birch, HPVA Grade A, whole piece face, rotary cut.
 - 1. Vertical Edges: Same species as face veneer.
 - 2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
 - 3. See Door Schedule for specific locations.
- B. Veneer Facing for Opaque Finish: Medium density overlay (MDO).
 - 1. See Door Schedule for specific locations.

2.05 ACCESSORIES

- A. Glazing: As specified in Section 08 8000.
- B. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.
- C. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.
- D. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

2.06 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge for hardware reinforcement.
 - 2. Provide solid blocking for other throughbolted hardware.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
 - 1. Exception: Doors to be field finished.
- E. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 13, Polyester, Catalyzed.
 - b. Stain: As selected by Commissioner.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

- E. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

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FMS No. - F175RES2
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SECTION 08 3100 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.

1.03 RELATED REQUIREMENTS

- A. Section 09 9000 - Painting and Coating

1.04 REFERENCE STANDARDS

- A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.05 SUBMITTALS

- A. See DDC General Requirements for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- D. Shop Drawings: Indicate exact position of all access door units.
- E. Manufacturer's Installation Instructions: Indicate installation requirements.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

- A. Walls, Unless Otherwise Indicated:

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

ACCESS DOORS AND PANELS
08 3100 - 1

1. Material: Steel.
 2. Size: 12 x 12 inches, minimum, unless otherwise indicated; and as required by equipment needing access.
 3. Tool-operated spring or cam lock; no handle.
 4. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.
 5. In Plaster: Drywall bead frame with door surface flush with wall surface.
 6. In Masonry: Surface mounted frame with door surface flush with frame surface.
- B. Walls in Wet Areas:
1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
 2. Size: 12 x 12 inches, minimum, unless otherwise indicated; and as required by equipment needing access.
 3. Tool-operated spring or cam lock; no handle.
 4. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.
 5. In Plaster: Drywall bead frame with door surface flush with wall surface.
 6. In Masonry: Surface mounted frame with door surface flush with frame surface.
- C. Fire Rated Walls: See drawings for wall fire ratings.
1. Material: Steel.
 2. Size: 12 x 12 inches, minimum, unless otherwise indicated; and as required by equipment needing access.
 3. Insulated, double skin door panel.
 4. Tool-operated spring or cam lock; no handle.
- D. Ceilings, Unless Otherwise Indicated: Same type as for walls.
1. Material: Steel.
 2. Size in Lay-in Grid Ceilings: To match grid module.
 3. Size in Other Ceilings: 12 x 12 inches, minimum, unless otherwise indicated; and as required by equipment needing access.
 4. Tool-operated spring or cam lock; no handle.
- E. Fire Rated Ceilings: See drawings for ceiling fire ratings.
1. Material: Steel.
 2. Size: 12 x 12 inches, minimum, unless otherwise indicated; and as required by equipment needing access.
 3. Tool-operated spring or cam lock; no handle.
- F. Removable Access Panels: Where indicated.
1. Material: Steel.
 2. Size: 12 x 12 inches, minimum, unless otherwise indicated; and as required by equipment needing access.
 3. Tool-operated catches.
- G. Insulated Access Panels:
1. Provide Insulated Access Panels between fully or partially conditioned spaces and the exterior; between fully and partially conditioned spaces .

2.02 WALL AND CEILING UNITS

- A. Manufacturers:
1. ACUDOR Products Inc: www.acudor.com.

2. Karp Associates, Inc: www.karpinc.com.
 3. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
 4. or approved equal.
- B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies that units are to be installed in.
1. Style: Exposed frame with door surface flush with frame surface.
 - a. In Gypsum Board: Use drywall bead type frame.
 - b. In Plaster: Use plaster bead type frame.
 2. Door Style: Single thickness with rolled or turned in edges.
 3. Frames: 16 gage, 0.0598 inch, minimum.
 4. Single Thickness Steel Door Panels: 1/16 inch, minimum.
 5. Double-Skinned Hollow Steel Door Panels: 16 gage, 0.059 inch, minimum, on both sides and each edge.
 6. Insulation: Non-combustible mineral or glass fiber.
 7. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
 - a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for the purpose indicated.
 8. Steel Finish: Primed.
 9. Primed and Factory Finish: Polyester powder coat; color as selected by Commissioner.
 10. Size: 12 x 12 minimum, unless otherwise indicated on the drawings; and as required by equipment needing access.
 11. Hardware:
 - a. Hardware for Fire Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - c. Latch/Lock: Screw driver slot for quarter turn cam latch.
 - d. Number of Locks/Latches Required: As recommended by the manufacturer for the size of the unit.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

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SECTION 08 3323 - OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Door 108; Lumber Storage.
- B. Overhead coiling doors, operating hardware, exterior, manual and electric operation.
- C. Wiring from electric circuit disconnect to operator to control station.

1.03 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 26 0533 - Empty Conduit Systems: Conduit from electric circuit to operator and from operator to control station.
- C. Section 26 2923 - Electrical Power Equipment: Power to disconnect.

1.04 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; National Electrical Manufacturers Association; 2000 (R2005), with errata, 2008.
- G. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide general construction, electrical equipment, component connections and details, and hardware.
- D. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.06 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. Alpine Overhead Doors, Inc: www.alpinedoors.com.
 - 2. The Cookson Company: www.cooksondoor.com.
 - 3. Overhead Door Corporation: www.overheaddoor.com.

2.02 COILING DOORS

- A. Exterior Coiling Doors: Steel slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
 - 2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.1.
 - 3. Installed R-value of door assembly: minimum R-4.75
 - 4. Finish: Galvanized.
 - 5. Finish: Factory painted, color to match commissioner's sample, FDNY Red.
 - 6. Guides: Angles; galvanized steel.
 - 7. Hood Enclosure: Manufacturer's standard; primed steel.
 - 8. Electric operation.
 - 9. Mounting: Surface mounted.

2.03 MATERIALS

- A. Curtain Construction: Interlocking slats.
 - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 - 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
 - 3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
- B. Steel Slats: Minimum thickness, 24 gage, .022 inch; ASTM A653/A653M galvanized steel sheet.
 - 1. Galvanizing: Minimum G90/Z275 coating.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Steel Guides: Formed from galvanized steel sheet complying with ASTM A653/A653M.
 - 1. Galvanizing: Minimum G90/Z275 coating.
 - 2. Prime paint.
- E. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
- F. Hardware:
 - 1. Lock Cylinders: Specified in Section 08 7100.
 - 2. Latching: Inside mounted, adjustable keeper, spring activated latch bar with feature to keep in locked or retracted position.
 - 3. Latch Handle: Interior and exterior handle.
- G. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.04 ELECTRIC OPERATION

- A. Electric Operators:
 - 1. Motor Rating: 1/3 hp; continuous duty.
 - 2. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 3. Controller Enclosure: NEMA 250, Type 1.
 - 4. Opening Speed: 12 inches per second.
 - 5. Brake: Adjustable friction clutch type, activated by motor controller.
 - 6. Manual override in case of power failure.
- B. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
 - 1. 24 volt circuit.
- C. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 26 2717.
- F. Complete wiring from disconnect to unit components.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 08 3616 - SECTIONAL OVERHEAD GARAGE DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 DEFINITIONS

- A. All work in this section shall be performed by overhead door Contractor under subcontract to General Construction Contractor unless otherwise noted.

1.03 SECTION INCLUDES

- A. Doors 100.1, 100.2, 100.5; Apparatus Floor.
- B. Furnish and install complete new overhead doors, electric door operators, control devices, wiring, accessories, etc. including bell warning systems in accordance with this section.

1.04 RELATED SECTIONS AND WORK

- A. Section 05 1200 - Structural Steel Framing
- B. Section 09 9000 - Painting and Coating
- C. Section 26 2400 - Electrical Service System
- D. Section 26 2923 - Electrical Power Equipment
- E. Contractor shall paint adjacent structural, framing and door jamb angle steel.
- F. Electrical Subcontractor shall be responsible for providing and installing work as noted throughout this section

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Product Data: Show component construction, anchorage method, and hardware.

- E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- F. Operation Data: Include normal operation, troubleshooting, and adjusting.
- G. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- H. Warranty: Submit manufacturer one year warranty and ensure forms have been completed in City of New York's name and registered with manufacturer.

1.06 WIRING DIAGRAM, BULLETINS, INSTRUCTIONS, ETC.

- A. Submit to City of New York one (1) complete set of the following:
 - 1. One (1) set of complete system internal and external wiring and control diagrams with color and numerical designations contained thereon. A recognizable facsimile of above system's wiring and control diagram shall be affixed to inside of control panel's cover.
 - 2. One (1) set of instructions, technical bulletins and other printed descriptive matter of all devices in order to provide complete information on proper operation, maintenance and repair of equipment, including ordering of replacement parts.
 - 3. A list of manufacturer's names, model numbers, type catalog numbers of all equipment provided, including circuit breakers, motor limit switches, etc.

1.07 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
 - 1. The New York City Building Code.
 - 2. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
 - 3. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
- B. Qualifications for Welding Work: Welders shall follow welding procedures in accordance with American Welding Society "Qualifications". Provide FDNY BFP "Certificate of Fitness" and "Citywide Permit" for welding and burning operations and operators, certifying that welders performing work have satisfactorily passed AWS qualification tests.

1.08 QUALIFICATIONS OF DOOR SUBCONTRACTOR

- A. Minimum of three (3) years experience in installation of motorized overhead doors. Individual experience as an employee of an organization may not be used to satisfy this requirement. Provide references for work similar to that required by this specification.

PART 2 - PRODUCTS

2.01 DOOR CONSTRUCTION

- A. Door shall be twenty 20-gauge ISO-DOR, flush design, slide-up door manufactured by Fimbel Door Corporation, Model SI-2024A.
- B. Provide and install regular 3" tracks with 15" radius of curvature or 3" low headroom tracks, as required by field conditions.
- C. Construct door in accordance with following schedule:
- | | | |
|-----------|-------------|-----------------------|
| Door thru | 8'-0" high | 4 Horizontal Sections |
| Door thru | 10'-0" high | 5 Horizontal Sections |
| Door thru | 12'-0" high | 6 Horizontal Sections |
| Door thru | 14'-0" high | 7 Horizontal Sections |
| Door thru | 16'-0" high | 8 horizontal Sections |
- D. Door shall consist of horizontal, flush steel-insulated sections. Each intermediate section shall be tongue and groove top and bottom to fit together with horizontal joints. No part of door shall project into opening when door is in fully raised position.
- E. Number of panels created by vertical intermediate stiles in each section shall be as follows:
- | | |
|------------------------------|-----------------|
| Doors 12'-6" wide and less: | 3 Panels Across |
| Doors 12'-7" to 16'-2" wide: | 4 Panels Across |
| Doors 16'-3" to 20'-2" wide | 5 Panels Across |
| Dors 20'-3" wide and over: | 6 Panels Across |
- F. Maximum distance between hinges shall be 48".
- G. Each section shall be designed to ride with HR-743, 3" sealed solid rollers in the 3" vertical and horizontal tracks, mounted on the interior side of each vertical jamb and overhead under ceiling.
- H. Horizontal edge of exposed bottom rail of door shall be scribed to contour of grade.
- I. Installed door assembly shall have a minimum R-value of R-4.75 per 2014 NYC Energy Conservation Code

2.02 SIZE OF DOOR

- A. Verify size for door as shown on drawings, and assume full responsibility thereof.
- B. Measurements of door as indicated hereinafter include a minimum (if field conditions permit) 2 1/2" lap at each existing door opening jamb and 1" lap at head of door opening. Finished thickness of door shall be 2".

- C. Furnish and install manufacturer's nameplate and rigidly secure to underside of horizontal track angle nearest to chain hoist unit of door. Plate shall permanently indicate name of manufacturer, actual weight of door, length, stretch and pull of each extension spring. Nameplate shall be made of engraved bakelite material with legible letter on a red background.

2.03 OVERHEAD DOOR SECTIONS

- A. PANELS: Exterior face to be flush continuous 20 gauge steel. Interior to be continuous embossed 24 gauge aluminum magnesium. Both skins to be laminated to a high density molded foam core to form a rigid sandwich panel with a R12 min energy value and a 30 P.S.F. wind-load rating.
 - 1. Replacement Sections: Furnish additional Original Equipment Manufactured replacement panels for door as follows:
 - a. Furnish and deliver to City of New York two (2) replacement sections, one bottom and one intermediate, for each door opening. Furnish and install a door label for each replacement (spare) section. Label shall contain the following information: Address, Engine or Ladder Co., size of panel, and whether it as a bottom or intermediate section.
 - b. Hang replacement sections on wall of apparatus floor in area shown on drawings. Provide and install three (3) equidistant steel brackets (12" to 18" deep), 8'-10" AFF, finish paint color to be determined by Commissioner and painted by Contractor.
- B. STILES: End stiles to be double end type, 13 gauge, for doors thru 20'-2" wide and triple end type for doors over 20'-2" wide. Intermediate overlay vertical hinge plates to be 3" wide, full section height minimum 16 gauge.
- C. FINISHES: Exterior face to be galvanized with baked-on epoxy primer and factory finished with two (2) coats of electro-statically applied enamel; exterior color to be PPG Industries #3HR762691, Red Tru Form (FDNY Red) or Commissioner approved equal. Interior skin to have epoxy primer and baked-on white finish.
- D. WINDOWS: For standard design, doors up to 18' wide shall have 2 windows. Doors wider than 18' shall have 4 windows. Windows shall have a rectangular frame 12" x 25", glazed with clear safety glass. Locate windows in third section up from bottom of door, at quarter points of the panel.
- E. PASS DOOR (WICKET DOOR), WHERE REQUIRED:
 - 1. Provide and install a pass door if and where shown on drawings. Door shall open outward and be installed with weather-strip at jambs, sill and head. At sill of opening, install a 13 ga thick steel cap channel.
 - 2. Provide and install for each pass door a heavy-duty automatic door closer, Dexter Co. Model #88 or Commissioner approved equal so as not to obstruct clear headroom.
 - 3. Size of pass door shall be no greater than 6'-8" in height from finished floor and no less than 2'-8" wide.
 - 4. Pass door shall be furnished with a clear safety glass vision panel, sized per paragraph D above, located in third section up from bottom of door.
 - 5. Provide and install all necessary hardware, including continuous heavy-duty single action spring hinges attached to each section. Hinges shall be of proper size and tension.
 - 6. Provide and install a heavy-duty coiled cable connected from operator to safety interlock switch on pass door.

2.04 **HARDWARE**

- A. All hinges shall be 11 gauge. Top and bottom fixtures shall be heavy duty type, not less than 13 gauge, of galvanized steel sheet. They shall be graduated in height and agree with inclination of vertical tracks in order to insure a uniform tight fit to jambs and head of opening when door is in closed position. Hinges and fixture rollers shall operate in perfect freedom from drag or binding at jambs when door is in operation.
- B. End hinges and top fixtures shall be double on all doors thru 20'-2" wide, and triple on all doors over 20'-2" wide. Intermediate hinges shall be installed at every vertical hinge plate. Bottom lifting fixtures shall be reinforced at corner edges and case hardened bolt area. Roller retaining bracket shall be completely welded to bottom fixtures.
 - 1. Attach hinges with heavy duty serrated head lags.
- C. Guide roller shall be solid steel tire, Model HR743, extra heavy duty permanently sealed type with automotive quality bearing. Stem shall be designed with 3/4" x 3/4" reinforcement collar and shall be extra long to accommodate double or triple hinges.
- D. Galvanized steel, reinforcing struts, shall be provided at bottom and top rails and at all intermediate, horizontal section joints as per the following schedule:

Doors up to 12'-6" wide:	No struts
Doors 12'-7" to 16'-2" wide	2" high struts
Doors 16'-3" to 19'-2" wide	2-1/2" high struts
Doors 19'-3" wide and over	3" high struts

2.05 **TRACKS AND TRACK ANGLES**

- A. Furnish and install door tracks not less than 11 gauge, 3" x 1-1/2" rolled steel, with vertical tracks inclined rearward in height of each door opening.
- B. Vertical tracks shall be mounted on, and arc welded to, minimum 3" x 3" x 3/16" continuous, structural steel angles. Angles shall extend from grade to a position 12" above cross head shaft over door opening. Angles shall be mounted on, and arc welded to, minimum 4" x 4" x 5/16" continuous structural steel angles, or larger if needed and as specified by Commissioner.
- C. Horizontal tracks shall be mounted on, and arc welded to, minimum 3" x 2" x 3/16" continuous, structural steel angles, supported from steel beams above.
- D. Tracks shall be arc welded to angles with welds not less than 1" in length, spaced not more than 24" o.c.

2.06 **BRACING**

- A. Furnish and install bracing systems at rear ends of horizontal track angles for both rearward and side thrust.
- B. Hanger and cleat angles shall not be less than 2" x 2" 1/4", diagonally braced with not less than 2" x 2" x 3/16" angles. Each cleat angle shall be secured to ceiling slab or beams with a minimum of three 3/8" x 3" lag screws and masonry anchors where masonry is encountered.

- C. All fastenings shall be provided with nuts, bolts and lock-washers. Hanger shall be double bolted to cleat and track angles.
- D. Bracing shall be secured to existing structure.
- E. Any additional steel framing required for bracing to be provided and installed by Door Subcontractor under this section.

2.07 COUNTERBALANCES, LOAD CHAINS, WEATHERSTRIPPING, ETC.

- A. Coil Springs: Counterbalance door by using heavy duty, high cycle parallel, oil tempered steel coil springs, extension type, with internal coil springs as required. New springs shall be of sufficient size to carry the weight of the door. Door parts shall be mounted above each horizontal door track, at right angles to door opening. Provide a tag wired to each spring, indicating length, stretch and pull. Door shall be balanced, adjusted and installed so that bottom edge of door is above head of required clear opening when in fully open position with hand chain not secured in locking position.
 - 1. Provide a tag wired to each spring indicating length, stretch, pull, and noting High Life Cycle Spring with a single stripe down entire length of spring. Color of painted stripe shall correspond to NAGDM official color codes.
- B. Load Chains: Door shall be hung with heavy duty, straight-link, electrically welded, case hardened, steel load chains that shall be fastened to the bottom cornered lifting fixtures by hardened steel pins or bolts. Chain shall pass up and over minimum 6" cast iron pocket wheels, mounted to cross header shaft and to heavy duty cast iron clevis pulleys at front end of each spring assembly. Pocket wheels shall be a minimum of 6" diameter, keyed and secured to cross head shaft with 1/4" square keys of sufficient length and two (2) set screws.
- C. Shaft: Door shall be provided with a split 1-1/4" diameter, fully round, solid steel, cross head shaft with keyways. Intermediate bearing support assemblies shall be provided for shaft as per manufacturer's recommendation. End bearing plates and intermediate bearings shall be provided for shaft. End bearing plates and intermediate bearings shall be sealed roller bearings.
- D. Cast iron, adjustable coupling sets with keyways shall be provided at center of each shaft as job conditions permit, and at end of shaft that joins operator drive shaft. Couplings shall be secured to shafting with 1/4" square keys of sufficient length and provided with two (2) set screws for each flange end.
- E. Provide split collars on shafting adjacent to pocket wheels, shaft supports and adjustable couplings to prevent walking of operating parts and square keys.

2.08 MISCELLANEOUS ITEMS

- A. Spring Guards: Steel guards shall be provided and attached to each horizontal track angle to position springs and pulleys above horizontal track angles. Install in such a manner that they do not interfere with normal operation of extension springs and clevis pulleys.
- B. Safety Wire Cables: Furnish and install safety wire cables (3/16" dia.) which shall run horizontally through extension springs from rear hanger of each horizontal track angle to end plates of front shaft. Cable tension shall be adjusted to withstand spring failure whiplash. Install double ferrules at one end of cable and double clamps at other end.
- C. Weatherstripping:

1. Provide and install a 1-1/2" high ME-123, manufactured by Miller Brothers or equal, electrically actuated yellow safety edge to bottom of each door. Top of each door will have a factory applied EPDM top seal.
 2. For steel jamb applications provide an EPDM jamb and header seal to be fastened to track by means of a clip system to allow for easy adjustment or replacement.
- D. Caulking: Caulk edges of mounting, angles that abut existing steel jamb plates.

2.09 PAINTING

- A. Steel Door Sections - as specified in Paragraph 2.3C in "Finishes".
- B. Door Subcontractor shall prime and paint all supports, brackets, etc. Thickness of each coat of paint shall be 0.003", color as specified by Commissioner.

PART 3 - EXECUTION

3.01 ELECTRICAL WORK

- A. New electric door operator, etc.
 1. Operator: Provide and install Model WL industrial operator, manufactured by Fimbel Door Corporation.
 - a. Operator shall be a side-mounted type and equipped with an emergency hand chain hoist for manual operation of door in case of an electrical malfunction or power failure.
 - b. Operator shall be mounted vertically and secured to structural steel and/or walls.
 - c. Operator shall be installed near overhead door.
 2. Motor: Furnish and install an instant reversing motor, high torque, totally enclosed, of sufficient horsepower to satisfactorily operate door at a speed of 3/4 ft. per second with 12 ft. high doors, taking 16 seconds to open.
 - a. Motor shall not be less than 3/4 H.P., 208 volts, 3 phase and shall be equal to above type motor that is manufactured by General Electric Co., Century Electric Co. or Commissioner approved equal. If Firehouse service is single phase 208/120v, then overhead motor shall be specified as per service.
 - b. Motor shall be tested for dielectric strength, heating and efficiency in accordance with A.I.E.E. standards. Insulation resistance and dielectric strength shall meet requirements of these standards as well. Verify by field testing at City of New York facility required phase for new motor and assume full responsibility for motor's voltage and phase.
 3. Reduction Unit: Motor shall be connected to a gear reduction unit which is separate from motor. Unit shall employ worm gears running in high grade oil. Output shaft shall be 3/4" diameter with an outboard bearing support. Connection of motor to gear reducer shall be with flexible coupling.
 4. Clutch: Operator shall employ an adjustable, friction type, safety clutch which will provide protection for door, operator and obstruction, should door travel become restricted. Clutch shaft shall be supported with heavy duty spherical type bearings.
 - a. Spring tension of clutch mechanism shall be adjustable by means of an adjustable nut and spring in order that proper slippage be obtained in starting door from rest. This would allow clutch to slip should movement of door be obstructed.

5. Brake: Operator shall employ a brake drum coupling assembly with solenoid of sufficient power to stop and hold door in any position.
6. Starter: Operator shall have an enclosed magnetic reversing starter with an overload protection interlock so that "open" and "close" contactor not be closed at same time.
 - a. Starter shall be installed as an integral part of motor and shall be factory wired. In the event that starter is furnished separately, subcontractor supplying equipment shall bear expense for field installation and connection.
 - b. Operator shall have a thermal overload protection device or a motor controlling device to protect motor and shall have a separate manual reset button, externally operated without removing electrical box cover.
 - c. Overload and related control box shall be properly labeled to identify which overhead door this overload is connected to. For example:

Overload
Engine Overhead Door 1

7. Limit Switches: Operator shall have two (2) limit switches for automatically stopping motor at extreme "open" and "close" door positions. These switches shall be enclosed in a box mounted on operator.
8. Emergency and Normal Manual Operation
 - a. To slow speed shaft of operating unit, a jaw disconnecting clutch shall be applied to release lever. A wire cable or heavy duty chain shall be attached and carried to a convenient point mounted on wall under electric operator. Door shall be released quickly from electric operation to emergency chain hoist operation. Provide two (2) rubber ball grips on cable or sash chain to facilitate quick and easy release. Ball grips shall be positioned to provide maximum leverage. Locate top ball grip 6'-3" above finished floor. The second rubber ball to be mounted in a position to slide under slot located in the chain keeper to keep unit in manual operation. See item "c" below.
 - b. Emergency and normal hand operation shall consist of an auxiliary geared chain hoist mounted integrally with operating unit. Hand chain shall extend to within 24 inches of floor. Hand chain shall have rust-resistant finish with chain links solid and welded. Hoist guard collar shall be rigidly secured to shaft by pinning through shaft.
 - c. Install a heavy duty steel angle (3/16" thick) locking bracket or hand chain keeper with a slot, steel lock pin and 3/16" lever for locking hand chain in position. Bracket slot shall accommodate a link from each hand chain run in addition to cable or sash chain release. Steel pin shall have a minimum length of 2-1/2" and shall be attached to bracket with a wire cable. A slot shall also be provided for release line to be held in position. This shall provide for hand operation of chain hoist unit.
 - d. Door shall be made available for hand operation by pulling release lever chain, disconnecting motor from door and engaging auxiliary chain hoist gears directly to door operating mechanism.

B. Installation of door operator, etc.

1. Motor drive support: Motor drive equipment shall be supported by a heavy steel angle frame with frame braced to wall and ceiling. Operator shall be side mounted, independent of door track angle installation with a 8" minimum clear space (where available) provided between operator parts and horizontal track angle edge. Wall supports shall be mounted vertically below operator and diagonally braced with operator frame. Install cleat, hanger and diagonal bracing supports at other end of operator frame and above same.

2. Connections to Door: New operating mechanism shall be directly coupled to overhead door's cross head shaft with a keyed, adjustable, cast iron coupling or heavy duty sprockets using #50 Roller Chain. Furnish 16 tooth # 50 sprocket on main shaft of door and 12 tooth # 50 sprocket on final output shaft of operator.
- C. Disconnect switch
1. Electrical subcontractor shall provide, install and wire electrical disconnect switch in vicinity of electric operator mechanism. Disconnect switch shall be used to disconnect power to operator for its maintenance. Operator drive shaft shall be aligned with crosshead shaft of door.
- D. Control devices and accessories
1. Push Button Control Station
 - a. One heavy duty, 3-button control station to be provided on each jamb of the door opening [Total of 2 control stations per door]. However, location depends on specific site conditions which may dictate a different location. Station shall be of momentary contact type, push button control station with (3) buttons marked "Open", "Close" and "Stop". Locate on interior front wall, near vertical track angle. Mount (5) feet above floor and label per this specification. Device shall be equal to Square D class 9001, BG305 heavy duty control station, or Commissioner approved equal.
 - b. Provide two-button control stations (one for each door), Allen Bradley Bulletin 800S, Cat 800-2AS series M, to Electrical subcontractor for installation in Housewatch Switch Panel. Door subcontractor and Electrical subcontractor shall coordinate and confirm control station switch specification is proper, prior to ordering.
 2. Overhead door warning bell
 - a. Furnish a heavy duty, 4", 24-volt, weatherproof, slotted gong type, warning bell with weatherproof back box. Bell is to ring continuously unless door is fully opened or fully closed (includes both chain hoist and electrical operation). Device shall be Edwards Cat. No. 340-4G5 (bell) and Cat. No. 348 S (back box).
 - b. Noise intensity of bell shall be cut in half by appropriate means.
- E. Safety reverse feature
1. Provide at bottom-side of door a Miller ME-123 or approved equal electric yellow safety edge to reverse downward motion of door upon hitting any obstacle. Safety edge shall be connected to electrical operator using a heavy-duty four (4) wire coiled cord. Reversing edge electrical circuit shall be provided with a "fail-safe" monitoring system, which shall notify Housewatch personnel that edge has become inoperative. Upon detecting an edge failure, this module shall turn on an LED indicator in Housewatch. In addition, module shall automatically change the "down" control button from "MOMENTARY" contact to "CONSTANT" contact requiring that someone must remain at door, depressing button until door is closed. Upon detecting that edge has been repaired or replaced, this module shall automatically turn off LED Indicator and return "down" control button to "MOMENTARY" contact. Indicator light shall be Siemens 3SB1001-6BH06 clear lens with red LED model 3SB1001-6DC06 mounted to a 3SB1430-2H enclosed in a P22CSM11, P22CSM211 or P22CSM311 depending on number of doors at Installation.
- F. Door Buzzer System
1. Where a pass door is required, provide and install a heavy-duty 24 volt, AC buzzer system with two (2) remotely located buzzers. Buzzers shall be located on apparatus floor and in dining area. Each time pass door is opened, a continuous buzzer will sound until door is closed.
 2. Buzzers shall be vibrating, dust-proofed, heavy-duty, fully enclosed, adjustable volume type of mechanism. Device shall be Edwards Cat. No. 340A-G5 or Commissioner approved equal. Intensity of buzzer can be adjusted.

3. Transformer shall be a heavy-duty 120/24 volts, 50 watt, Edward Cat. No. 88-50 or Commissioner approved equal.
 4. All other materials not specifically described but required for a complete and proper installation of all work in this Paragraph F shall be provided and installed by the Door Subcontractor and subject to approval of City of New York. Magnetic contacts will not be accepted.
- G. Installation of Wiring, Conduits, Etc.
1. Conduit, Wiring, Etc.
 - a. Door Subcontractor shall furnish, and Electrical Subcontractor shall install switches, relays, and other electrical materials required to interconnect and make the operator, switches, controls, bell and light system circuits, etc. operational. Wiring and conduit required under this Section 08 3616 shall be provided and installed by Electrical Subcontractor. All wiring shall be installed in conduit, including low-voltage systems. All conduit shall be galvanized on apparatus floor and in cellar.

3.02 EXAMINATION

- A. Field verify that openings are ready to receive work prior to commencement.

3.03 MISCELLANEOUS WORK AT EACH DOOR

- A. Cycle Counter
1. Provide at each overhead door a non re-settable counter for each overhead door, Fargo EM6B70AC24 or Commissioner approved equal. Counter shall be located inside door control panel.
- B. Overhead Door Adjustments, Operations, Etc.
1. Door shall be neatly installed in its proper position with fixed units firmly fastened in place and operating units adjusted to work properly and easily including disengagement mechanism.
 2. Door shall have minimum clearances necessary for operating without binding. Provide and install any additional hardware, equipment, devices, etc. that is necessary for operation of door in accordance with City of New Yorks requirements mentioned herein. Adjust positioning of track angles as necessary.
 3. Adjust tension of all springs as necessary for proper emergency chain hoist operation.
 4. Electrical door operator and door component parts including warnings bells shall be adjusted to work properly. Tighten all set screws on various components of Units. Remove excess slack in roller chains. Adjust electrical limits as necessary to place each door into proper operation.
 5. Lubricate track curvature.
 6. Furnish and install an LED light to indicate that door safety edge is not working. Light shall be located above door control button in Housewatch. Above light, install a sign stating:

WARNING
IF LIGHT IS ON, OVERHEAD DOOR SAFETY EDGE
IS NOT WORKING
CALL FOR EMERGENCY SERVICE IMMEDIATELY
(718) 999-4357 or (718) 999-7900

- a. Sign shall be 6" wide by 2 1/2" high. Letters shall be white color, 3/8" high, with a red background.

7. Provide and install name plates on two (2) and three (3) button stations, LED indicator in Housewatch, operator disconnect switch and overload button.
 - a. Nameplate shall read "Overhead Door #_____" and shall be made of engraved Bakelite material with 3/8" white letters on a red background.

3.04 START-UP

- A. Start-up services: Engage a factory-authorized service representative to perform start-up services and to instruct City of New York's maintenance personnel as specified below.
- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Instruct City of New York's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventative maintenance.
- D. Review data in maintenance manuals. Refer to DDC General Conditions.
- E. Schedule instruction with City of New York giving at least 7 days advance notice.

3.05 DRILLING, CUTTING, PATCHING, ETC.

- A. Provide all drilling, cutting, patching and restoration required by this work, and restore any existing work damaged by installation. All work shall be restored to City of New York's satisfaction. Any work which is inferior or unsatisfactory to City of New York's judgment shall be removed and restored to the City's satisfaction.
- B. Restoration - If such drilling or cutting is done on finished surfaces of equipment structure, any marring of surface shall be made good by repair or replacement by Subcontractor. Subcontractor shall be held responsible for restoration due to excessive cutting or drilling; and any damage to the building or its contents caused by him or his workmen.

3.06 GUARANTEE

- A. Guarantee for a period of one (1) year after substantial completion of work and subsequent acceptance by City of New York of equipment and installations. All component parts shall be free from defects in materials and workmanship and shall operate in accordance with their intended use and meet or exceed manufacturers' published specifications. One (1) year guarantee period shall commence on date of substantial completion as defined in the General Conditions.
- B. Repair or replacement installations or component parts shall be guaranteed to be new or equivalent to new in performance.
- C. Any items of equipment or component parts that are added, or replacement items for equipment that is under guarantee, are automatically covered by this guarantee. Subcontractor shall provide and bear cost of transportation and insurance of both personnel and material to designated locations and return, to meet its obligations under this guarantee. Subcontractor shall provide and bear cost of all labor and all materials required to meet its obligations under this guarantee.
- D. Respond to repair requests twenty-four (24) hours a day, seven (7) days a week, within three (3) hours from telephone or other notification by City of New York. Acknowledge request for guarantee services within fifteen (15) minutes from oral notification. All guarantee work shall be completed within two (2)

calendar days. Provide appropriate labor, equipment, tools, parts, materials and supplies to City of New York's facility.

- E. Act as agent of City of New York in obtaining manufacturer's guaranties of all equipment and materials required by this Contract in name of City of New York and deliver same to City of New York.
- F. Doors and electric operators shall be guaranteed by manufacturer for a period of five (5) years or 100,000 cycles, whichever comes first. If within applicable guarantee period, material is found to be defective, manufacturer will provide replacements to City of New York at no charge. In case of door springs, they shall be replaced on a pro-rated basis as determined by number of cycles.
- G. Provide a minimum of one additional guarantee service call, for each installation, during eleventh (11) month of one (1) year guarantee period to insure that door and electric operator mechanisms are in proper working order. Check, adjust, service as needed, or replace worn parts as needed. This guarantee service shall be coordinated with City of New York. Failure to make arrangements shall automatically extend guarantee until such inspection occurs.

END OF SECTION

SECTION 08 4013 - FIRE-RATED GLAZED WALLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. ALUM-4: Fire-rated single-story glazed walls.
- B. Doors in fire-rated glazed walls.
- C. Door hardware and weatherstripping.
- D. Firestopping between exterior wall and edge of floor slab.

1.03 RELATED REQUIREMENTS

- A. Section 07 8420 - Fire-Resistive Joint Systems: Firestop at exterior wall assembly junction with structure.
- B. Section 08 8000 - Glazing: Glazing installed in other assemblies.

1.04 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.
- B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; American Architectural Manufacturers Association; 2009.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. New York City Energy Conservation Code, 2014.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide evidence of compliance with fire performance criteria and manufacturer's published product data on framing components, glazing, anchorage and fasteners, and doors, if any.
- D. Test Reports: Submit results of full-size mock-up testing for criteria other than fire performance. Reports of tests previously performed on the same design are acceptable.
- E. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
- F. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- G. Samples: Submit samples illustrating each exposed metal finish, outside and inside.
 - 1. For color anodized aluminum, submit minimum of two samples illustrating expected range of color in actual production.
 - 2. For factory-finished steel members, submit color selection samples.
- H. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- I. Report of field testing for water leakage.
- J. Warranty: Submit manufacturer warranty and ensure forms have been completed in City of New York's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. 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. 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.

1.08 MOCK-UP

- A. See DDC General Conditions for general requirements for mock-ups.
- B. Provide mock-up including all components occurring on project. Assemble to illustrate all components of the assembly, including attachments, anchors, and perimeter sealant.
- C. Locate on-site where directed. Mock-up may remain as part of the Work.

- D. Locate off-site where directed. Remove when directed.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 FIRE-RATED GLAZED WALLS

- A. Basis of Design:
 - 1. Technical Glass Products; Fireframes Heat Barrier Series with Fireframes Heat Barrier Series doors: www.fireglass.com.
- B. Acceptable Manufacturers:
 - 1. Technical Glass Products; Fireframes Heat Barrier Series with Fireframes Heat Barrier Series doors: www.fireglass.com.
 - 2. SAFTI FIRST, a division of O'Keefe's Inc; GPX Architectural Series with fire resistive walls/windows: www.safti.com.
 - 3. Vetrotech Saint-Gobain USA; VDS 60 with VDS Doors: www.vetrotechusa.com.
- C. Exterior Glazed Fire-Rated Walls: Factory fabricated, factory finished framing members with glazing, and related flashings, anchorage and attachment devices.
 - 1. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 2. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

3. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
 4. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- D. Fire Performance: Hourly rating as indicated; tested as an assembly including glazing.
1. Exterior Wall at Ground Level: 1 HR.
 2. Exterior Wall above Ground Level: 1-HR.
 3. Acceptable evidence of compliance includes UL listing.
- E. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
1. Design Wind Loads: Comply with the requirements of New York City Building code.
 - a. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
 - b. Member Deflection: For spans less than 13 feet 6 inches, limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch, whichever is less and with full recovery of glazing materials.
 - c. Member Deflection: For spans over 13 feet 6 inches and less than 40 feet, limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch, with full recovery of glazing materials.
 2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
 - a. Expansion and contraction caused by 180 degrees F surface temperature.
 - b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
 - c. Movement of wall relative to perimeter framing.
 - d. Deflection of structural support framing, under permanent and dynamic loads.
- F. Water Penetration Performance Requirements: No uncontrolled water on indoor face when tested as follows:
1. Test Pressure Differential: 10 pound-force per square foot.
- G. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 pounds per square foot pressure differential across assembly.
- H. Thermal Performance Requirements:
1. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
 2. Overall U-value Including Glazing: 0.38 Btu/(hr sq ft deg F), maximum.

2.02 COMPONENTS

- A. Framing Members: Formed steel structural members with aluminum cladding and non-combustible thermally-resistive material as required for fire rating.
1. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 2. Glazing stops: square.
 3. Cross-Section: As indicated on drawings.

4. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Structural Steel Sections: ASTM A36/A36M; shop primed.
- C. Structural Supporting Anchors: See Section 05 1200.
- D. Structural Supporting Anchors Attached to Reinforced Concrete Members: Design for welded attachment to weld plates embedded in concrete.
- E. Fasteners: Stainless steel.
 1. Arrange fasteners and attachments to conceal from view.
- F. Exposed Flashings: 0.032 inch thick aluminum sheet; finish to match framing members.
- G. Concealed Flashings: 0.018 inch thick galvanized steel.
- H. Firestopping: As specified in Section 07 8400.
- I. Glazing Gaskets: Type to suit application to achieve fire-rating, weather, moisture, and air infiltration requirements.
- J. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

2.04 DOORS AND HARDWARE

- A. Doors: Glazed hollow steel.
 1. Thickness: 1-3/4 inches.
 2. Top Rail: 6 inches wide.
 3. Vertical Stiles: 6 inches wide.
 4. Bottom Rail: 8 inches wide.
 5. Glazing Stops: Square.
 6. Finish: Same as framing.
- B. Door Hardware:
 1. Types: Provide wall assembly manufacturer's standard type of hardware to suit application.
 2. Finish on Hand-Contacted Items: 630.
- C. Exterior Doors:
 1. Hinges: Butt type, swing clear; top, intermediate, and bottom.
 2. Closers: concealed.
 3. Exit Devices: See Section 08 7100.
 4. Weatherstripping: Wool pile, continuous and replaceable.
 5. Sill Sweep Strips: Resilient seal type, retracting; neoprene.
 6. Threshold: Extruded aluminum, one piece per door opening, ribbed surface.
- D. Interior Doors:
 1. Hinges: Butt type, swing clear; top and bottom.

2. Closers: concealed.
3. Exit Devices: See Section 08 7100.

2.05 FINISHES

- A. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
 1. Touch-up surfaces cut during fabrication so that no natural metal surfaces are visible in completed assemblies, including joint edges.
- B. Aluminum Finish: Superior performing organic coatings.
 1. Factory finish all surfaces that will be exposed in completed assemblies.
 2. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 3. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- C. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
- D. Color: To be selected by Commissioner from manufacturer's custom range.
- E. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

- A. Install wall system in accordance with limitations of fire rating and with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set door thresholds in bed of mastic and secure.
- J. Install door hardware using templates provided.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 feet non-cumulative or 0.5 inches per 100 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
- C. Sealant Space Between Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. Provide the services of the manufacturer's field representative to observe installation and make report.
- B. Exterior Walls: Test installed wall for water leakage in accordance with AAMA 501.2 hose test.
- C. Replace components that have failed field testing and retest until performance is satisfactory.

3.05 CLEANING

- A. Remove protective material from pre-finished surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

FIRE-RATED GLAZED WALLS
08 4013 - 8

SECTION 08 4313 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. **ALUM-3:** Interior aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Door hardware.

1.03 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.
- C. Section 08 8000 - Glazing: Glass and glazing accessories.

1.04 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill and door hardware .
- D. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- E. Samples: Submit two samples 12x12 inches in size illustrating finished aluminum surface, glass, glazing materials.
- F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in City of New York's name and registered with manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 GUARANTEE

- A. See DDC General Conditions for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Kawneer Aluminum Storefront System:

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

ALUMINUM-FRAMED
STOREFRONTS
08 4313 - 2

1. EnCORE Thermal Storefront System - 1-3/4" x 4-1/2" nominal dimension; Front Glazed, Screw Spline Fabrication.
- B. Or approved equal.

2.02 BASIS OF DESIGN -- SWINGING DOORS

- A. Medium Stile, Monolithic Glazing:
 1. Basis of Design: Kawneer Aluminum Entrances 350 Swing Door; Medium stile, 6" vertical face dimension.
 2. Thickness: 1-3/4 inches.

2.03 MANUFACTURERS

- A. Aluminum-Framed Storefront and Doors:
 1. Kawneer North America: www.kawneer.com.
 2. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
 3. YKK AP America Inc: www.ykkap.com.
 4. or approved equal.

2.04 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 1. Unitized, shop assembly.
 2. Glazing Rabbet: For 1/2 inch laminated monolithic glazing.
 3. Finish: Class II natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 4. Finish Color: To match Commissioner's sample.
 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements:
 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of the New York City Building Code.
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8.00 lbf/sq ft.
3. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 pounds per square foot pressure differential across assembly.
4. Overall U-value Including Glazing: 0.39 Btu/(hr sq ft deg F), maximum.

2.05 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
 1. Framing members for interior applications need not be thermally broken.
 2. Glazing stops: Flush.
 3. Cross-Section: 1 3/4 x 4 1/2 inch nominal dimension.
- B. Glazing: As specified in Section 08 8000.
 1. For Interior Framing: Type GL-9.
- C. Swing Doors: Glazed aluminum.
 1. Thickness: 1 3/4 inches.
 2. Top Rail: 6 inches wide.
 3. Vertical Stiles: 6 inches wide.
 4. Bottom Rail: 8 inches wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.

2.06 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- D. Glazing Accessories: As specified in Section 08 8000.

2.07 FINISHES

- A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.
- B. Color: To match Commissioner's sample.

2.08 HARDWARE

- A. Other Door Hardware: As specified in Section 08 7100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- G. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.
- H. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 4413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. Section includes:
1. **ALUM-1: 4-Sided Structurally Glazed Aluminum Curtain Wall System**, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall units.
 - a. Location: Typical exterior glazing system
 - b. Basis of Design: Kawneer Clearwall SS; 2-1/2" x 6-5/8", outside glazed with recessed glass edge spacer insulating glass.
 2. **ALUM-2: 2-Sided Structurally Glazed Aluminum Curtain Wall System**, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall units.
 - a. Location: Exterior sloped wall at L2, Rm. 214, Company Office
 - b. Basis of Design: Kawneer 1600 SS; 2-1/2" x 6", outside glazed structural silicone glazed (SSG) format.

1.03 RELATED REQUIREMENTS:

- A. Division 07 2500 - Weather Barriers: for materials used to bridge between glazed aluminum curtain walls and building intersection.
- B. Division 07 9005 - Joint Sealants: for joint sealants installed as part of the glazed aluminum curtain walls system.
- C. Division 08 4313 - Aluminum-Framed Storefronts.
- D. Division 08 6300 - Metal-Framed Skylights.

1.04 REFERENCES (INDUSTRY STANDARDS)

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.
- B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

- D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
- E. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2000 (Reapproved 2011).
- F. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2014.
- G. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications; 2006 (Reapproved 2010)
- H. ASTM C1401 - Standard Guide for Structural Sealant Glazing; 2014.
- I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- L. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- M. New York City Energy Conservation Code, 2014.

1.05 DEFINITIONS

- A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) - AAMA Glossary (AAMA AG).

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one month before starting work of this section; require attendance by all affected installers.

1.07 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Loosening or weakening of fasteners, attachments, and other components.
 - d. Failure of operating units.

- B. Engineering Services: Provide glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York, using performance requirements and design criteria indicated.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
- D. Structural-Test Performance: Test according to ASTM E 330 and TAS 202 as follows:
1. When tested at positive and negative wind load design pressures, assemblies do not evidence deflection exceeding $L/175$ of clear span.
 2. A static air design load of 40 psf (1915 Pa) shall be applied in the positive and negative direction.
 - a. When tested at 150% of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2% percent of clear span.
 - b. Minimum test duration according to ASTM E 330 is 10 seconds.
- E. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding $L/175$ of the glass edge length for each individual glazing lite, or an amount that restricts edge deflection of individual glazing lites to $3/4$ inch (19 mm), whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to $[L/360$ of clear span or $1/8$ inch (3.2 mm), whichever is smaller] [amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than $1/8$ inch (3.2 mm)].
 - a. Operable Units: Provide a minimum $1/16$ -inch (1.6-mm) clearance between framing members and operable units.
 3. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.
- F. Seismic Story Drift: Accommodate design displacement of adjacent stories indicated.
1. Design Displacement: Shall not exceed 1% of story height.
 2. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- G. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 and TAS 202 at 15psf (720 Pa).
- H. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 15psf (720 Pa).
1. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
- I. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
 2. Test Interior Ambient-Air Temperature: [75 deg F (24 deg C)] .
 3. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

- J. Energy Performance: Glazed aluminum curtain walls shall be tested in accordance with NFRC and AAMA Standards.
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of no greater than 0.38 (HP Low-e) as determined according to AAMA 1503.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than .27 as determined according to NFRC 200.
 3. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq.ft. (0.31 l/s.m²) of fixed wall area as determined according to ASTM E 283 and TAS 202 at a minimum static-air-pressure differential of 6.24 psf (300 Pa).
 4. Condensation Resistance: When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
 - a. CRF_{glass} (HP Low-e) = 61, CRF_{frame} = 78
 5. Condensation Index (I): when tested to CSA-A440-00, the Condensation Index shall not be less than:
 - a. I_{glass} (HP Low-e) = 56, I_{frame} = 74
- K. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics:
1. STC-33 or OITC-28 when tested for laboratory sound transmission loss according to ASTM E 90 and ASTM E 1425, and based on 1-1/8" insulating glass (1/4", 5/8" AS, 1/4").
 2. STC-37 or OITC-30 when tested for laboratory sound transmission loss according to ASTM E 90 and ASTM E 1425, and based on 1" insulating glass (1/4", 1/2" AS, 1/4" with Laminate).

1.08 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing and doors.
- D. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- E. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.
- F. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glazing, infill panels, and glazing materials.
- G. Structural Sealant Glazing (SSG): Submit product data and calculations showing compliance with performance requirements.
- H. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
- I. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure.

- J. Structural Glazing Adhesive: Submit product data and calculations showing compliance with performance requirements.
- K. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- L. Warranty: Submit manufacturer warranty and ensure forms have been completed in City of New York's name and registered with manufacturer.

1.09 QUALITY ASSURANCE

- A. Engineer Qualifications: Provide structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at New York.
- B. 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.
- C. Manufacturer Qualifications:
 - 1. 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. Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.
- E. Full-Size Mock-up Testing: Have a specimen representative of project conditions tested by an independent testing agency for compliance with specified thermal, structural, air infiltration, water penetration, and sound attenuation criteria.
- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in DDC General Conditions.

1.10 MOCK-UP

- A. See DDC General Conditions for general requirements for mock-ups.
- B. Provide mock-up as indicated on the drawings including each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
- C. Locate on-site where directed by Commissioner. Mock-up may remain as part of the Work.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.12 PROJECT CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.
- B. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.13 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design:
 - 1. Kawneer Company Inc.
- B. Other Manufacturers: Provide either the products identified as "Basis of Design" or, subject to availability of equivalent design detailing and performance, a product of one of the manufacturers listed below:
 - 1. Wausau Window and Wall Systems: www.wausauwindow.com.
 - 2. Schüco USA: www.schueco.com/web/us.
 - 3. YKK AP America Inc: www.ykkap.com.
- C. or approved equal.

2.02 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.
- C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- F. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- G. Structural Glazing Tape: closed cell, double sided acrylic foam tape.
- H. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 CURTAIN WALL FRAMING

- A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Glazing System: Retained mechanically with toggles on four sides.
 - 2. Glazing Plane: Front.
- B. Where framing metal is exposed to the exterior, frames shall be thermally broken.
- C. Glass: 1-1/8" insulating glass with recessed glass edge spacer.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as specified and tested by manufacturer.
- F. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.
 - 1. Toggle Assembly: Toggle assembly as tested by manufacturer.
- G. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- H. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- I. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after installation.

2.04 GLAZING

- A. Glazing: Comply with Division 08 Section "Glazing".

- B. Glazing Gaskets: Gaskets to meet the requirements of ASTM C509.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: As recommended by manufacturer for joint type.

2.05 OPERABLE UNITS

- A. Energy Performance:
 - 1. Thermal Transmittance (U-factor): Operable glazing and framing areas shall have U-factor of no greater than 0.45 (HP Low-e) as determined according to AAMA 1503.
 - 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than .40 as determined according to NFRC 200.
- B. Vents:
 - 1. Basis-of-Design Product:
 - a. Kawneer Company Inc.
 - b. GLASSvent for Curtain Wall, Project-Out.
 - c. 3-7/16" Overall System Depth
 - d. AAMA 501, 50 psf (2394 Pa)
- C. Doors: Comply with Division 08 Section "Aluminum-Framed Entrances and Storefronts."
 - 1. The door stile and rail face dimensions of the entrance door as follows:

Vertical Stile	Top Rail	Bottom Rail
6"	6"	8"

 - a. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick
 - b. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
 - c. Provide adjustable glass jacks to help center the glass in the door opening.
- D. Hardware:
 - 1. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely aluminum-framed entrance doors.
 - 2. Standard Hardware:
 - a. Weatherstripping:
 - 1) Meeting stiles on pairs of doors shall be equipped with two lines of weathering stripping utilizing wool pile with polymeric fin.
 - 2) The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be a weathering strip and a wool pile with polymeric fin.
 - b. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).
 - c. Threshold: Extruded aluminum, thermally broken, with ribbed surface.

- d. Butt Hinge: Stainless Steel w/ Powder Coating & Non Removable Pin (NRP).
- e. Push/Pull: See Section 08 7100.
- f. Exit Device: See Section 08 7100.
- g. Closer: See Section 08 7100.

2.06 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762 mm) thickness per coat.

2.07 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 7. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - 8. Double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- C. Curtain Wall Framing: Fabricate components for assembly using screw spline or shear block system following manufacturer's standard installation instructions.
- D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.08 ALUMINUM FINISHES

- A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
- B. Color: To match Commissioner's sample.

PART 3. EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- G. Install glazing as specified in Division 08 Section "Glazing."

3.03 FIELD QUALITY CONTROL

- A. Field Tests: Commissioner shall select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting

specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.

- B. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
 - 1. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², which ever is greater.
 - 2. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf (383 Pa).
- C. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.04 ADJUSTING, CLEANING AND PROTECTION

- A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
- B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

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FMS No. - F175RES2
ISSUE DATE - 10/12/2015

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

GLAZED ALUMINUM CURTAIN
WALLS
08 4413 - 12

SECTION 08 6300 - METAL-FRAMED SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum skylight framing system.
- B. Skylight glazing.
- C. Fasteners, anchors, reinforcement, and flashings.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing: Structural support framing for system.
- B. Section 05 5000 - Metal Fabrications: Fabricated steel attachment devices.
- C. Section 07 6200 - Sheet Metal Flashing and Trim: Skylight counterflashing.
- D. Section 07 9200 - Joint Sealants: Sealing joints between skylight frames and adjacent construction.
- E. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- I. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2015.
- J. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 [Reapproved 2012]e1.

- K. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- L. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- M. New York City Energy Conservation Code, 2014

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide manufacturer's specifications, standard details, and installation requirements.
- D. Shop Drawings: Indicate framed opening requirements and tolerances, spacing of all members, anticipated deflection under load, affected related work, expansion and contraction joint locations and details, and sizes and locations for field welding.
- E. Selection Samples: Submit full range of aluminum finish samples for Commissioner's color selection.
- F. Samples: Submit two samples, not less than 12 by 12 inch in size illustrating appearance of prefinished aluminum and specified glazing system, including glazed edge and corner.
- G. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- H. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
- I. Manufacturer's Installation Instructions: Indicate special procedures, safety precautions, and perimeter conditions requiring special attention.
- J. Field Quality Control Submittals: Report of field testing for water leakage.

1.05 QUALITY ASSURANCE

- A. Engineer Qualifications: Provide skylight system under direct supervision of a professional structural engineer experienced in design of work of the type specified in this section and licensed in New York.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than three years of documented experience.

1.06 MOCK-UP

- A. Construct mock-up that includes examples of materials and conditions required in finished skylight installation. Size mock-up as indicated on drawings.
- B. Locate where directed by Commissioner.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide wrapping to protect prefinished aluminum surfaces. Do not use adhesive papers or spray coatings that bond when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Correct defective work, including leaks, discoloration, failure of seal at insulated glazing units, and excessive thermal or structural movement, within a one year period after the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal-Framed Skylights:
 - 1. United Skys, Inc.: www.unitedskys.com.
 - 2. Wasco Skylights: www.wascoskylights.com.
 - 3. Super Sky Products Enterprises, LLC: www.supersky.com.
 - 4. or approved equal.

2.02 METAL-FRAMED SKYLIGHTS

- A. Metal Framed Skylights: Factory-fabricated, glazed.
 - 1. Frame: Extruded aluminum structural members with integral condensation collection and guttering system thermally separated from exterior pressure bar.
 - 2. Glazing System: Pressure glazing bar system for sloped joints and two (2)-sided structural sealant glazing (SSG) for horizontal joints.
 - 3. Glazing: Insulating glass.
 - 4. Aluminum Finish: High performance organic coatings.
 - 5. Fabricate to prevent harmonic vibration, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
- B. Performance Requirements: Provide products that comply with the following:
 - 1. Structural Design: Design and size components to withstand dead loads and specified live loads without damage or permanent set.
 - 2. Wind Loads: Test in accordance with ASTM E330/E330M, using loads 1.5 times the specified design pressures and 10 second duration of maximum load.

3. Glazing Support Member Deflection Under Wind Load: 1/180 of span, maximum.
4. Thermal Movement: Design system to accommodate thermal expansion and contraction over ambient temperature range of 100 degrees F, dynamic loading and release of loads, creep of concrete structural members, and deflection of structural support framing without damage to skylight system components or loss of weathertightness.
5. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of no greater than 0.50 (HP Low-e) as determined according to AAMA 1503.
6. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than .40 as determined according to NFRC 200.
7. Air Leakage: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft for glazed area, measured at a reference differential pressure across assembly of 1.57 psf in accordance with ASTM E283.

2.03 OPERABLE UNITS

- A. Energy Performance:
 1. Thermal Transmittance (U-factor): Operable glazing and framing areas shall have U-factor of no greater than 0.50 (HP Low-e) as determined according to AAMA 1503.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than .40 as determined according to NFRC 200.
- B. Vents:
 1. Manufacturer:
 - a. United Skys, Inc.: www.unitedskys.com.
 - b. Kawneer Company Inc.: www.kawneer.com
 - c. Solar Innovations, Inc: www.solarinnovations.com
 - d. or approved equal
 2. 3-7/16" Overall System Depth
 3. AAMA 501, 50 psf (2394 Pa)

2.04 MOTORIZED OPENER

- A. Manufacturer:
 1. Truth Hardware Sentry II Motorization System: www.truth.com.
 2. Solar Innovations, Inc: www.solarinnovations.com
 3. Wasco Skylights: www.wascoskylights.com.
 4. or approved equal.
- B. Opener:
 1. Provide skylight vent motorized operation system of capacity adequate to operate scheduled skylight vents.
 2. Remote control: Motorization system to be installed with remote operation and control capability.
 3. Rain sensing automated closure: provide corrosion resistant rain sensor to allow independent control of each motor.
 4. Synchronous motor operation: allow for synchronous operation of multiple motor installations.

2.05 MATERIALS

- A. Aluminum Extrusions: Alloy 6063-T5, 6063-T6, or 6061-T6 members complying with ASTM B221 (ASTM B221M), with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.
- B. Formed Aluminum: Sheet material of alloy 5052, 5005, or 6061-T651 members complying with ASTM B209 (ASTM B209M), with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.
- C. Internal Reinforcement: ASTM A36/A36M; steel shapes as required for strength and mullion size limitations, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
- D. Glass: Type GL-2/GL-4 as indicated on the drawings and specified in Section 08 8000.
- E. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.
- F. Touch-Up Primer for Galvanized Steel Surfaces: Zinc rich type.
- G. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M Type I.
- H. Fasteners: Stainless steel.
- I. Flashing: Matching finish of skylight frame system components; secure using concealed fastening method, and seal with weather sealing type sealant.
 - 1. Aluminum sheet, 20 gage, 0.032 inch minimum thickness.

2.06 FABRICATION

- A. Rigidly fit and secure joints and corners with screw and spline. Make joints rigid, with connections that are flush, hairline, and weatherproof.
- B. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.
- C. Drain to exterior any water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system.
- D. Prepare components to receive concealed anchorage devices. Ensure that fasteners and anchorage devices will be concealed upon completion of installation.

2.07 FINISHES

- A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system; both interior and exterior surfaces.
- B. Color: To match Commissioner's control sample.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing and other adjacent work to ensure weathertight construction.

3.02 PREPARATION

- A. Apply 1 coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.03 INSTALLATION

- A. Install metal-framed skylights in accordance with manufacturer's instructions.
- B. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.
- C. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Install base flashings in accordance with Section 07 6200.
- E. Install glazing in accordance with Section 08 8000.
- F. Touch up damaged finishes so repair is imperceptible from 6 feet. Remove and replace components that cannot be satisfactorily touched up.

3.04 TOLERANCES

- A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet, or 3/8 inch total in overall dimension.
- B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches.

3.05 FIELD QUALITY CONTROL

- A. Test installed skylight for water leakage in accordance with AAMA 501.2.

3.06 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down exposed surfaces; wipe surfaces clean.
- C. Remove excess sealant by methods recommended by skylight manufacturer.

END OF SECTION

SECTION 08 7100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum, and [5] the Contract [City of New York Standard Construction Contract]

1.02 SUMMARY

- A. The Work of this Section shall include, but not be limited to, the following:
 - 1. Furnishing and installing of finish hardware.

1.03 QUALITY ASSURANCE

- A. Finish hardware where required shall conform to the applicable requirements of the American Insurance Association, Underwriter's Laboratories, Inc., local codes and all other regulations and agencies having jurisdiction. Such items of hardware shall bear a label or mark indicating its conformance to the above requirements.
- B. Manufacturer: A finish hardware manufacturer who has been successfully manufacturing products of the type specified for not less than 3 years. Each type of finish hardware or accessory shall be obtained from only one manufacturer.

1.04 REFERENCES

- A. Comply with applicable provisions of the following reference standards except as otherwise shown or specified.
 - 1. Building Hardware Manufacturer's Association (BHMA).
 - 2. Underwriter's Laboratories (UL).
 - 3. United States Standards (US).
 - 4. Hollow Metal Manufacturer's Association, Division of the National Association of Architectural Metal Manufacturers.
 - 5. American National Standards Institute (ANSI).
 - 6. Door and Hardware Institute (DHI).

1.05 SUBMITTALS

- A. Hardware supplier shall prepare and submit for approval 6 copies of the complete detailed hardware schedule.
- B. The supplier of hardware shall be solely responsible for any errors or omissions of the schedules, and all security hardware equal in kind and quality to that herein specified or required shall be supplied.
- C. Identify hardware items unsuitable for use as scheduled.
 - 1. Templates and/or shop drawing information shall be sent to each manufacturer who requires such information. Approved hardware schedule shall be sent to each manufacturer who requires template information.
 - 2. Maintenance instructions.

1.06 PRODUCT HANDLING

- A. As hardware is received, sort and repackage in containers marked with the hardware set number.

1.07 JOB CONDITIONS

- A. Coordination: Coordinate hardware with other work. Tag each item or package separately, with identification related to the hardware schedule, and include basic installation instructions in the package. Provide hardware items of proper design for door thickness, profile, swing, security and similar requirements, for proper installation and function. Deliver individually packaged hardware items at the proper times to the proper locations for installation.
- B. Product Information: Furnish hardware templates installation instructions and wiring diagrams as required to each fabricator of doors and frames to be factory-prepared for the installation of hardware. Upon request, check the shop drawings of such other work, to confirm that adequate provisions are made for the proper installation of hardware.

PART 2 - PRODUCTS

2.01 SCHEDULED HARDWARE

- A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of builders' hardware are indicated. Products are identified by using appropriate hardware designation numbers.
- B. One or more manufacturers are listed for each hardware type required. Provide either the product designated, or the equivalent product of one of the other listed manufacturers. Provide products of a single manufacturer for each product type.

2.02 MATERIALS AND FABRICATION, GENERAL

- A. The drawings show the direction of movement of each door leaf. Furnish each item of hardware for proper installation and operation of the door movement as shown.
- B. Do not use manufacturer's products which have manufacturer's name or trade name in a visible location, except in conjunction with required UL labels.
- C. Fasteners: Manufacture hardware to conform to published templates, generally prepared for machine screw installation. Do not furnish hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
 - 1. Provide concealed fasteners for hardware units which are exposed when the door is closed, except to the extent no standard units are available with concealed fasteners. Standard exposed fasteners shall be modified to render the installations vandal resistant, but readily serviceable for maintenance. Welded covers will not be acceptable.
- D. Should any hardware, even though required by the Contract Drawings or Specifications, fail to meet the intended requirements or require modification to suit or fit the designated location, such correction and modification shall be made as necessary and in ample time to void delay in the manufacture and delivery of the hardware. Changes and modifications shall not be made without prior notification, and approval, by the Commissioner. The Contractor shall make such corrections and modifications as directed and approved without extra cost to the City of New York.

2.03 HINGES

A. Butt Hinges - Acceptable Manufacturers:

1. McKinney Mfg. Co. (scheduled).
2. Stanley.
3. Hager Hinge Co.
4. Approved equal.

B. Note: Unless otherwise noted, butt hinges shall be full mortise, five knuckle ball or oil impregnated bearings with flat button tip.

1. Doors up to 3'-0" - Standard Weight. TA2714 - 4-1/2 inches by 4-1/2 inches.
2. Doors over 3'-0", Exterior doors - Extra Heavy Weight. T4A3786 - 5 inches by 4-1/2 inches, T4A3386 - 5 inches by 4-1/2 inches.
3. Doors up to 7'-6" - 1-1/2 pair per leaf.
4. Doors over 7'-6" to 10'-0" - 2 pair per leaf.

C. Exterior doors shall have stainless steel hinges and non-removable pins.

D. Exterior doors shall have extra heavy hinges.

E. Hinges shall conform to ANSI/BHMA A156.1.

2.04 CLOSERS

A. Acceptable Manufacturers for Overhead Closers, Floor Closers and Pivots:

1. Sargent.
2. Rixson
3. LCN
4. Approved equal

B. Basis of Design:

1. Regular Arm Closers: 4040XT Series by LCN
2. Parallel Arm Closers: 4040XT Series by LCN
3. Parallel Arm Closers with Stop: 4040XT Cush Series by LCN
4. Concealed Overhead Closer: 2030 Series by LCN

C. Closers are required to be accessible to the physically handicapped. Provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.

D. Closers scheduled for fire labeled doors shall bear Underwriter's Laboratories, Inc. approval.

E. Closers shall have secure arms and covers. Closer cover shall be metal with aluminum finish.

F. Closers shall be sized in accordance with the accepted manufacturer's standards to suit height, width, weight of door and draft conditions.

G. Closers shall be provided with accessories required to interface with other hardware items and door functions.

2.05 LOCKS

A. Lock Functions: As indicated in door hardware schedule.

- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 - C. Lock Backset: 2-3/4 inches, unless otherwise indicated.
 - D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - E. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
 - F. Locks to accept the MEDECO 32W0201H-26-H3S Removable Core.
 - G. Acceptable Manufacturers:
 - 1. Arrow
 - 2. Sargent
 - 3. Schlage
 - 4. Approved equal
 - H. Basis of Design
 - 1. Locksets: Arrow QL Series.
 - 2. Trim Designs: Sierra - SB
 - I. Provide nonferrous metal strikes with lips of sufficient length to protect jambs. Finish strikes with wrought box strikes and treat lock parts with bronze alloy plating to resist corrosion.
 - J. Locks shall comply with ANSI/BHMA A156.13.
- 2.06 CYLINDERS AND KEYING
- A. Provide locks with removable cylinders which comply with performance requirements of ANSI A156.5.
 - 1. Provide factory construction cores for the Contractor's use.
 - 2. Provide removable cores for cylinders matching MEDECO 32W0201H-26-H3S Removable Core.
- 2.07 OVERHEAD STOPS AND HOLDERS
- A. Overhead Stops and Holders: BHMA A156.8.
 - B. Overhead Concealed Slide Stops: Type 1; Grade 1; with stop, shock absorber.
 - C. Acceptable Manufacturers:
 - 1. Sargent.
 - 2. Glynn-Johnson.
 - 3. Rixson.
 - 4. Approved equal.

D. Basis of Design:

1. Concealed Overhead Stop: 100 Series by Glynn Johnson.
2. Heavy Duty Surface Overhead Stop: 70 Series by Glynn Johnson
3. Surface Overhead Stop: 450 Series by Glynn-Johnson.

2.08 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; cast brass base metal.
- B. Dome-Type Floor Stop: Grade 1; with minimum 1-inch-high bumper for doors without threshold and 1-3/8-inch-high bumper for doors with threshold.
- C. Wall Bumpers: Grade 1; with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall; with backplate for concealed fastener installation; with concave bumper configuration.
- D. Acceptable Manufacturers:
1. Ives.
 2. Sargent.
 3. Rockwood.
 4. Approved equal.
- E. Basis of Design:
1. Floor Stop: FS13 by Ives
 2. Wall Stop: WS401 by Ives

2.09 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- B. Acceptable Manufacturers:
1. NGP.
 2. Zero.
 3. Reese.
 4. Approved equal.
- C. Basis of Design: 870AA Zero International.

2.10 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
- B. Acceptable Manufacturers:
1. NGP.
 2. Zero.
 3. Reese.
 4. Approved equal.

- C. Thresholds shall be extruded aluminum unless otherwise indicated.
- D. Basis of Design: 556A Zero International.

2.11 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.
- B. Manual-Extension Flush Bolts: Grade 1, fabricated from extruded brass or aluminum, with 12-inch rod actuated by flat lever; listed and labeled for fire-rated doors. Provide top and bottom bolts with dustproof strike.
- C. Dustproof Strikes: Grade 1, polished wrought brass, with 3/4-inch-diameter, spring-tension plunger.
- D. Acceptable Manufacturers:
 - 1. Ives.
 - 2. Glynn Johnson.
 - 3. Rockwood.
 - 4. Approved equal.
- E. Basis of Design: 550 Series by Rockwood.

2.12 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.
- B. Automatic Flush Bolts: Grade 1, fabricated from steel and brass components, with spring-activated bolts that automatically retract when active leaf is opened and that automatically engage when active door depresses bolt trigger; listed and labeled for fire-rated doors. Provide brass or stainless-steel cover plate, top and bottom dustproof strikes, guides, guide supports, wear plates, and shims.
- C. Dustproof Strikes: Grade 1, polished wrought brass, with 3/4-inch-diameter, spring-tension plunger.
- D. Acceptable Manufacturers:
 - 1. Ives.
 - 2. Glynn Johnson.
 - 3. Rockwood.
 - 4. Approved equal.
- E. Basis of Design: 2845 Series by Rockwood.

2.13 EXIT DEVICES

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
- B. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- C. Mortise Exit Devices: Grade 1.

1. Type: Type 10, narrow stile.
2. Grade: Grade 1.
3. Actuating Bar: Push pad.
4. Material: Stainless steel.
5. Electrified Options:

a. Battery operated keypad.

D. Exit Device Outside Trim: Lever; material and finish to match locksets, unless otherwise indicated.

1. Match design for lock trim, unless otherwise indicated.

E. Acceptable Manufacturers:

1. Sargent.
2. Von Duprin.
3. Approved equal.

F. Basis of Design: 8300 Series by Sargent.

2.14 OPERATING TRIM AND PROTECTIVE TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

B. Flat Push Plates: 1/8 inch thick, 4 inches wide by 16 inches high stainless steel with square corners and beveled edges; secured with exposed screws.

C. Push-Pull Plates: 1/8 inch thick, 4 inches wide by 16 inches high stainless steel with square corners, beveled edges, and raised integral lip; secured with exposed screws. Pull size 8 inches by 3/4 inch diameter.

D. Kick Plate Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Kick Plates: 8 inches high by door width less 2 inches for frame stops.
2. Provide kick plates on push side of doors with closers.

E. Acceptable Manufacturers:

1. Ives.
2. Door Controls International.
3. Rockwood
4. Approved equal.

F. Basis of Design:

1. Door Pull: 107 x 70C by Rockwood
2. Push Plate: 73C by Rockwood.
3. Kick Plates: K1125 Rockwood.

2.15 ELECTROMAGNETIC STOPS AND HOLDERS

A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.

1. Provide power requirements and wiring.
- B. Acceptable Manufacturers:
 1. Rixson.
 2. Security Door Controls.
 3. Dorma
 4. Approved equal.
- C. Basis of Design: EH20 by Security Door Controls

2.16 ACCESSORIES FOR DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
 1. Coordinators shall be provided with matching profile fillers to fill entire width of door opening.
 2. Acceptable Manufacturers:
 - a. Ives.
 - b. Door Controls International.
 - c. Rockwood
 - d. Approved equal.
 3. Basis of Design: COR by Ives.
- B. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter 1/2 inch; fabricated for drilled-in application to frame. Provide 3 for single doors and 2 for pairs of doors.

2.17 FINISHES

- A. Finishes Specified:

1. Hinges	US32D (630)
2. Locks and Latches	US26D (626)
3. Door Closers	EN
4. Stops and Holders	US32D (630)
5. Miscellaneous	US32D (630)

PART 3 - EXECUTION

3.01 GENERAL

- A. Furnish suitable templates, together with the reviewed finish hardware schedule, to the respective trades as required, to insure the accurate setting and fitting of finish hardware.

3.02 HARDWARE APPLICATION

- A. Locate hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations and except as may be otherwise directed.

- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finish work specified in the Division-9 Sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

3.03 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Demonstrate to the Commissioner that each item is in perfect working order and that tagged keys operate respective locks. Correct items of hardware not acceptable to the Commissioner. Deliver tagged keys to the Commissioner upon acceptance of each core cylinder installation.
- C. Adjust door control devices to compensate for final operation of heating, cooling and ventilation equipment.

3.04 HARDWARE SETS

HW Set 1 (Doors 001, 017.1, S01.0, S02.1)

Hinges	
Latchset (Passage)	
Door Closer	Regular Arm
Floor Stop	
Silencers	

HW Set 1A (Doors 019)

Hinges	
Latchset (Passage)	
Door Closer	Regular Arm
Concealed Overhead Stop	
Silencers	

HW Set 1B (Doors 201)

Hinges	
Latchset (Passage)	
Floor Stop	
Silencers	

HW Set 1C (Doors 017.1, 017.2)

Hinges
Latchset (Passage)
Door Closer Parallel Arm
Concealed Overhead Stop
Silencers

HW Set 1D (Doors S01.5, S01.6)

Hinges
Latchset (Passage)
Door Closer Parallel Arm
Heavy Duty Overhead Stop
Weatherstrip Head and Jamb
Saddle

HW Set 1E (Doors 218, 219)

Hinges
Latchset (Passage)
Concealed Overhead Door Closer
Surface Overhead Stop
Silencers

HW Set 1F (Doors 106

Hinges
Latchset (Passage)
Door Closer Concealed
Floor Stop
Silencers

HW Set 1G (Doors S01.3, S01.4

Hinges
Latchset (Passage)
Door Closer Concealed Overhead
Magnetic Hold Open
Floor Stop
Silencers

HW Set 2 (Doors 004, 005, 006, 011, 015, 107

Hinges
Lockset (Storage)
Door Closer Regular Arm
Floor Stop
Silencers

HW Set 2A (Doors 012.1, 013

Hinges
Lockset (Storage)
Door Closer Parallel Arm with stop
Silencers

HW Set 2B (Doors 010, 014, 204.2

Hinges
Lockset (Storage)
Concealed Overhead Stop
Silencers

HW Set 2C (Doors 003, 007, 215.1, 216

Hinges
Lockset (Storage)
Floor Stop
Silencers

HW Set 3 (Doors 002,

Hinges
Lockset (Storage)
2 Door Closers Regular Arm
2 Concealed Overhead Stops
Auto Flush Bolt set
Dust Proof Strike
Coordinator
Silencers

HW Set 3A (Doors 008, 009, 215.2

Hinges
Lockset (Storage)
2 Concealed Overhead Stops
Manual Flush Bolt set
Dust Proof Strike
Silencers

HW Set 4 (Doors 012.2,

Hinges
Lockset (Storage)
2 Door Closers Parallel Arm with Stop
Auto Flush Bolt set
Dust Proof Strike
Coordinator
Silencers

HW Set 5 (Doors 018.2, 018.3, 105.1, 204.1, 208, 210, 213.1

Hinges
Push Plate
Pull
Kick Plate
• Door Closer Regular Arm
Floor Stop
Silencers
• Provide concealed closer for Doors 105.1, 204.1, 208, 210, 213.1

HW Set 5A (Doors 110

Hinges
Push Plate
Pull
Kick Plate
Door Closer Parallel Arm with Stop
Silencers

HW Set 5B (Doors 018.1

Hinges
2 Push Plate)
2 Pull
3 Kick Plate
2 Door Closer Parallel Arm with Stop
Silencers

HW Set 5C (Doors 203, 206.1

Hinges
Push Plate
Pull
Kick Plate
Door Closer Concealed overhead
Surface Overhead Stop
Silencers

HW Set 5D (Doors 207, 212, 213.2, 217,

Spring Hinges
Push Plate
Pull
Roller Latch
Floor Stop
Kick Plate
Adjustable spring safety gate Item# PLS1562 by NEWPIG
Silencers

HW Set 6 (Doors 018.4

Hinges
Lockset (Storage)
Door Closer Parallel Arm with stop
Weatherstrip Head and Jamb
Saddle

HW Set 7 (Doors 100.3 100.4

Hinges
Lockset (Combination Type)
Door Closer Concealed overhead
Surface Overhead Stop
Saddle

HW Set 8 (Doors 109, 211)

Hinges
Lockset (Privacy)
Floor Stop
Silencers

HW Set 9 (Doors 104)

By Sliding Door Manufacturer

HW Set 10 Not Used

HW Set 10A Not Used

HW Set 10B (Doors S01.2, S02.2, 101, 105.2)

- Hinges
- Exit Device (Lever x keypad)
- Door Closer Concealed Overhead
- Surface Overhead Stop
- Weatherstrip Head and Jamb
- Saddle

- Keypad at Door 101 only

HW Set 10C (Doors S03.1)

- Hinges
- 2 Exit Device (Lever)
- 2 Door Closer Concealed Overhead
- 2 Surface Overhead Stop
- Auto Flush Bolt Set
- Coordinator
- Dust Proof Strike
- Weatherstrip Head and Jamb
- Saddle

HW Set 10D (Doors 206.2)

Hinges
Exit Device (Passage x Lever)
Door Closer Concealed Overhead
Surface Overhead Stop
Weatherstrip Head and Jamb
Saddle

HW Set 10E (Doors S01.1)

Hinges
Exit Device (Passage x Lever)
Door Closer Concealed Overhead
Surface Overhead Stop

HW Set 10F (Doors 300)

Hinges

Exit Device (Lever)

2 Door Closer

Concealed Overhead

2 Surface Overhead Stop

Auto Flush Bolt Set

Coordinator

Dust Proof Strike

Weatherstrip Head and Jamb

Saddle

HW Set 11 (Doors 202, 209, 214.1, 214.2)

Hinges

Lockset (Dormitory)

Floor Stop

Silencers

HW Set 11A (Doors 213.3)

Hinges

Lockset (Dormitory)

Concealed Overhead Stop

Silencers

HW Set 11B (Doors 213.4, 214.3)

Hinges

Lockset (Dormitory)

Door Closer

Concealed Overhead

Surface Overhead Stop

Weatherstrip Head and Jamb

Saddle

HW Set 12 (Doors 112)

Sliding Door Set

2 Recessed Pulls

Edge Pull

END OF SECTION 087100

SECTION 08 8000 - GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Glass.
- B. Glazing compounds and accessories.

1.03 RELATED REQUIREMENTS

- A. Section 07 2500 - Weather Barriers.
- B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 3616 - Sectional Overhead Garage Doors: Glazed lites in doors.
- D. Section 08 4013 - Fire-Rated Glazed Walls: Glazing fire-tested as part of the wall assembly.
- E. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.
- F. Section 08 4413 - Glazed Aluminum Curtain Walls: Glazing furnished by wall manufacturer.
- G. Section 08 8300 - Mirrors.

1.04 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Commissionerural Glazing Materials; current edition.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. ASTM C1172 - Standard Specification for Laminated Commissionerural Flat Glass; 2009e1.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- H. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
- I. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

- J. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.
- K. New York City Energy Conservation Code, 2014.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- D. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- E. Samples: Submit two samples 12x12 inch in size of glass and plastic units, showing coloration and design.
- F. Certificates: Certify that products meet or exceed specified requirements.
- G. Manufacturer's Certificate: Certify that all glass meets or exceeds specified requirements.
- H. Maintenance Materials: Furnish the following for City of New York's use in maintenance of project.
 - 1. See DDC General Conditions for additional provisions.
 - 2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.08 MOCK-UP

- A. See DDC General Conditions for additional mock-up requirements.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the Work.

1.09 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.

- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.10 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN - INSULATING GLASS UNITS

- A. Types GL-1, GL-2 - Sealed Insulating Glass Units: Vision glazing, with Low-E coating.
 - 1. Application: All exterior glazing unless otherwise indicated.
 - a. GL-1: without ceramic frit. See drawings for locations.
 - b. GL-2: with ceramic frit. See drawings for locations.
 - 2. Between-lite space filled with argon.
 - 3. Thermal Resistance (U-Value): 0.29, nominal.
 - 4. Total Solar Heat Gain Coefficient: 0.27, nominal without frit.
 - 5. Total Visible Light Transmittance: 60 percent to 65 percent.
 - 6. Basis of Design: Guardian Industries Corp: www.sunguardglass.com.
 - 7. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
 - a. Coating: Custom ceramic frit pattern on outboard lite, surface #1.
 - b. Tint: Low Iron.
 - 8. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
 - a. Coating: Low-E on #3 surface.
 - 9. Opacifier: Ceramic frit #1 surface
 - 10. Opacifier Color: warm grey; 10% coverage with custom pattern.
 - 11. Total Thickness: 1 inch.
 - 12. or approved equal.

2.02 OTHER GLAZING UNITS

- A. Type GL-6 - Sealed Insulating Glass Units: Spandrel glazing.
 - 1. Application: Exterior glazing where indicated.
 - 2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Same as on vision units, on #2 surface.
 - 3. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
 - a. Tint: Clear.
 - b. Opacifier: Ceramic frit, on #4 surface.

- c. Opacifier Color: to match Commissioner's sample.
 - 4. Total Thickness: 1 inch.
- B. Type GL-3 - Sealed Insulating Glass Units: Safety glazing.
 - 1. Application: Provide this type of glazing in the following locations:
 - a. Glazed sidelights and panels next to doors.
 - b. Other locations required by applicable federal, state, and local codes and regulations.
 - c. Other locations indicated on the drawings.
 - 2. Type: Same as other vision glazing except use fully tempered float glass for both outboard and inboard lites.
- C. Type GL-4 - Custom Laminated Sealed Insulating Glass Units: Vision glazing, low-E.
 - 1. Application(s): Top of skylight assembly.
 - 2. Between-lite space filled with argon.
 - 3. Thermal Resistance (U-Value): 0.24 winter, nominal.
 - 4. Total Solar Heat Gain Coefficient: 0.27, nominal with frit.
 - 5. Total Visible Light Transmittance: 49 percent to 54 percent.
 - 6. Outboard Lite #1: tempered float glass, 3/8 inch thick.
 - a. Opacifier: custom frit Jet-Printer pattern on surface #1; 7% coverage.
 - b. Opacifier Color: warm grey.
 - c. Tint: Low-iron.
 - 7. Interlayer: 0.060 SGP sheet
 - 8. Outboard Lite #2: tempered float glass, 3/8 inch thick.
 - a. Tint: Low-iron.
 - 9. Inboard Lite: tempered float glass, 3/8 inch thick.
 - a. Coating: Low-E on #5 surface.
 - b. Tint: Low-iron.
 - 10. Total Thickness: 1 5/8 inch.
- D. Type GL-5 - Fire-Protection-Rated Glazing:
 - 1. Fire Protection Rating: UL 1HR
 - 2. Safety Certification: 16 CFR 1201 Category II.
 - 3. Application: Provide this type of glazing in the following locations:
 - a. Locations indicated on the drawings: Stair 01, Training Tower windows and doors.
 - 4. Thickness: 1 3/4 inch total thickness.
 - 5. Glazing Method: As required for fire rating.
- E. Type GL-9 - Interior Laminated Safety Glazing: Laminated glass/plastic glazing.
 - 1. Application:
 - a. Health/Fitness Rooms
 - b. Level 2 Clerestory windows.
 - c. Other locations as indicated on the drawings.
 - 2. Outer Layer: 1/4" clear tempered float glass.
 - 3. Interlayer: PVB sheet
 - 4. Inner Layer: 1/4" clear tempered float glass.
- F. Type GL-7 - Sealed Insulating Glass Units: Vision glazing, with Low-E coating.
 - 1. Application: Kitchen/ Dining Room, Conference Room, House Watch.
 - 2. Between-lite space filled with argon.
 - 3. Thermal Resistance (U-Value): 0.29, nominal.

4. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
 - a. Low-E Coating.
 - b. Tint: Low-Iron Glass.
 5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
 - a. Tint: Low-Iron Glass.
 6. Total Thickness: 1 inch.
- G. Type GL-10 - Mirrors: See Section 08 8300

2.03 EXTERIOR GLAZING ASSEMBLIES

- A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Design Pressure: Calculated in accordance with applicable codes.
 2. Glass thicknesses listed are minimum.
- B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
1. In conjunction with vapor retarder and joint sealer materials described in other sections.
 2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.04 GLASS MATERIALS

- A. Float Glass Manufacturers:
1. Guardian Industries Corp: www.sunguardglass.com.
 2. Pilkington North America Inc: www.pilkington.com/na.
 3. PPG Industries, Inc: www.ppgideasapes.com.
 4. or approved equal.
- B. Float Glass: Provide float glass based glazing unless noted otherwise.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
 3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
 4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.
- C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
 2. Plastic Interlayer:
- D. Fire-Resistance-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
1. See Section 08 4013 for glazing in fire-rated framing assemblies.
 2. IBC Fire Resistance Rating: W-45, minimum.
 3. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.
 4. Safety Certification: 16 CFR 1201 Category II.
 5. Products:
 - a. Technical Glass Products; Pilkington Pyrostop: www.fireglass.com.
 - b. SAFTI FIRST; SuperLite II-XL: www.safti.com

- c. Vetrotech Saint-Gobain North America; Contraflam: www.vetrotechusa.com.
 - d. or approved equal.
- E. Fire-Protection-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
- 1. IBC Fire Protection Rating: As indicated on drawings.
 - 2. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.
 - 3. Labeling: Provide permanent label on each piece giving the IBC rating and other information required by the applicable code.

2.05 SEALED INSULATING GLASS UNITS

- A. Sealed Insulating Glass Units: Types as indicated.
- 1. Application: Exterior, except as otherwise indicated.
 - 2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 3. Edge Spacers: Polymer based warm edge spacers.
 - 4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 - 5. Edge Seal Color: black.
 - 6. Purge interpane space with dry hermetic air.

2.06 GLAZING COMPOUNDS

- A. Manufacturers:
- 1. Bostik Inc: www.bostik-us.com.
 - 2. Pecora Corporation: www.pecora.com.
 - 3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 4. or approved equal.
- B. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; clear color.

2.07 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.
- 1. Width: As required for application.
 - 2. Thickness: As required for application.

- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; black color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.04 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- E. Trim protruding tape edge.

3.05 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.06 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.08 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 08 8300 - MIRRORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Glass mirrors.
 - 1. Tempered safety glass.

1.03 REFERENCE STANDARDS

- A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- B. GANA [TIPS] - Mirrors: Handle with Extreme Care [Tips for the Professional on the Care and Handling of Mirrors]; Glass Association of North America; 2011.

1.04 SUBMITTALS

- A. See DDC General Requirements for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in City of New York's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA [TIPS].

1.06 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See DDC General Requirements for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Trulite Glass and Aluminum Solutions: www.trulite.com.
 - 2. Binswanger Mirror/ACI Distribution: www.binswangerglass.com.
 - 3. Lenoir Mirror Co: www.lenoirmirror.com.
 - 4. or approved equal.

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
- B. Mirror Glass; Type GL-7: Clear, tempered safety glass; ASTM C1048, with copper and silver coatings, and protective overcoating.
 - 1. Thickness: 1/4 inch.
 - 2. Size: As shown and noted on drawings.

2.03 ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness.
- C. Glazing Tape: Preformed butyl compound; 10 to 15 Shore A durometer hardness; on release paper.
- D. Glazing Clips: Manufacturer's standard type.
- E. Mirror Attachment Accessories: Stainless steel clips.
- F. Channel Frame: One piece, channel frame, stainless steel, Type 430, satin finish, 1/2 inch by 1/2 inch by 3/8 inch deep with 90 degree mitered corners.
- G. Integral 4" deep stainless steel shelf attached to bottom of mirror.
 - 1. Finish: Satin #4.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for mirrored glazing are correctly sized and within tolerance.
- B. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 INSTALLATION

- A. Install mirrors in accordance with GANA (TIPS) and manufacturers recommendations.
- B. Set mirrors plumb and level, and free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
- D. Installation in Frames:
 - 1. Install mirrors resting on setting blocks. Install applied stop and center mirror by use of spacer shims at 24 inch on center and at 1/4 inch below sight line.
 - 2. Locate and secure mirror using spring wire clips.
 - 3. Fill gaps between mirror and stops with glazing compound until flush with sight line, and tool surface to straight flush line.

3.03 CLEANING

- A. Remove wet glazing materials from finish surfaces.
- B. Remove labels after work is complete.
- C. Clean mirrors and adjacent surfaces.

END OF SECTION

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SECTION 08 9100 - LOUVERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.03 RELATED REQUIREMENTS

- A. Section 07 6200 - Sheet Metal Flashing and Trim.
- B. Section 23 3113 - Ductwork attachment to louvers .

1.04 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2013.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- D. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- E. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.
- F. Test Reports: Independent agency reports showing compliance with specified performance criteria.
- G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.07 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Provide 10 year manufacturer warranty against distortion, metal degradation, and failure of connections.
1. Finish: Include coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wall Louvers:
1. Airolite Company, LLC: www.airolite.com.
 2. American Warming and Ventilating: www.awv.com.
 3. Construction Specialties, Inc: www.c-sgroup.com.
 4. or approved equal.

2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
1. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
 2. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.
- B. Stationary Louvers : Horizontal blade, extruded aluminum construction, with concealed intermediate mullions.
1. Free Area: 50 percent, minimum.
 2. Blades: Sightproof with drainable edge design.
 3. Frame: Depth as indicated on drawings, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 4. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
 5. Aluminum Finish: Superior performing organic coatings; finish welded units after fabrication.
 6. Color: Custom, to match approved sample.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), .

- B. Bird Screen: Interwoven wire mesh of steel, 0.063 inch diameter wire, 1/2 inch open weave, diagonal design.
- C. Insect Screen: 18 x 16 size aluminum mesh.

2.04 FINISHES

- A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
- B. Color: Custom, to match approved sample.

2.05 ACCESSORIES

- A. Blank-Off Panels: Same material as louver, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Insect Screen: 18 x 16 size aluminum mesh.
- D. Fasteners and Anchors: Galvanized steel.
- E. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louver frames in openings with concealed fasteners.
- E. Coordinate with installation of mechanical ductwork.

3.03 **CLEANING**

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION

SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Specified criteria for gypsum wallboard assemblies including :
 - 1. Post-consumer recycled paper content in the gypsum wallboard paper facing; and
 - 2. Post-industrial recycled content (synthetic gypsum) in the gypsum wallboard cores (optional).
- C. Metal stud wall framing.
- D. Metal channel ceiling framing.
- E. **GWB-1: Gypsum Wallboard**
- F. **GWB-2: Type-X Gypsum Wallboard**
- G. **GWB-3: Impact resistant gypsum wallboard.**
- H. **GWB-4: Moisture resistant gypsum wallboard.**
- I. **GWB-5: Cementitious backing board.**
- J. **GWB-6: Gypsum sheathing.**
- K. Joint treatment and accessories.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 07 2100 - Thermal Insulation.
- C. Section 07 8410 - Through-Penetration Firestop Systems.
- D. Section 07 8420 - Fire-Resistive Joint Systems: Top-of-wall assemblies at fire rated walls.

1.04 REFERENCE STANDARDS

- A. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2013.1.

- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
- E. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).
- F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- J. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
- K. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- L. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- M. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- N. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- O. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2007a (Reapproved 2011).
- P. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2013.
- Q. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 1999 (Reapproved 2010).
- R. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets; 2014.
- S. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- T. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2014a.
- U. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.

- V. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
 - W. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
 - X. ASTM E413 - Classification for Rating Sound Insulation; 2010.
 - Y. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
 - Z. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.
 - AA. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2012.
- 1.05 SUBMITTALS**
- A. See DDC General Conditions for submittal procedures.
 - B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
 - C. Manufacturer's certification of recycled content per section 2.01 of this specification.
 - D. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
 - E. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.
 - F. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- 1.06 DELIVERY AND STORAGE**
- A. Gypsum wallboard to be stored per manufacturer's recommendations for allowable temperature and humidity range. Panels shall not be allowed to become damp.
 - B. Where feasible, gypsum wallboard shall not be stored with materials which have high emissions of VOCs or other contaminants (see section 3.01 below).
- 1.07 QUALITY ASSURANCE**
- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 3 years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Environmental Criteria:
 - 1. Recycled Content:

- a. Gypsum wallboard shall contain recycled content material as follows:
 - b. Paper facings: a minimum of 100% post-consumer recycled paper content.
 - c. Gypsum cores: Where feasible, a minimum of 75% post-industrial recycled gypsum content (also called "synthetic" gypsum - from coal-fired power plants).
2. The percentage of recycled content is based on the weight of the component materials.

2.02 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
1. See PART 3 for finishing requirements.
- B. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
 2. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
 2. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.03 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 2. Marino: www.marinoware.com.
 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 4. or approved equal.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Studs: "C" shaped with flat or formed webs with knurled faces.
 2. Runners: U shaped, sized to match studs.
 3. Ceiling Channels: C-shaped.
 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 5. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.
 - a. Manufacturers - Resilient Furring Channels:
 - 1) Same manufacturer as other framing materials.
 - 2) or approved equal.
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.04 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: www.americangypsum.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 4. Lafarge North America Inc: www.lafargenorthamerica.com.
 5. National Gypsum Company: www.nationalgypsum.com.
 6. USG Corporation: www.usg.com.
 7. or approved equal.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 3. Unfaced fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 5. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 1/2 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 6. Paper-Faced Products:
 - a. American Gypsum; EagleRoc Regular Gypsum Wallboard and FireBloc Type X Gypsum Wallboard.
 - b. American Gypsum Company; LightRoc Gypsum Wallboard.
 - c. CertainTeed Corporation; ProRoc Brand Gypsum Board.
 - d. CertainTeed Corporation; ProRoc Brand Abuse Resistant Gypsum Board.
 - e. Georgia-Pacific Gypsum; ToughRock.
 - f. Lafarge North America Inc; Regular Drywall and Firecheck Type X and Type C.
 - g. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
 - h. USG Corporation; Sheetrock Brand Gypsum Panels.
 - i. or approved equal.
 7. Glass Mat Faced Products:
 - a. Georgia-Pacific Gypsum; DensArmor Plus.
 - b. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant.
 - c. National Gypsum Company; Gold Bond eXP Fire-Shield Interior Extreme Gypsum Panel.
 - d. or approved equal.
- C. Impact Resistant Wallboard:
1. Application: High-traffic areas indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
 4. Unfaced Type: Interior fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M.
 5. Type: Fire resistance rated Type X, UL or WH listed.
 6. Thickness: 5/8 inch.

7. Edges: Tapered.
 8. Products:
 - a. American Gypsum Company; M-Bloc IR Type X.
 - b. National Gypsum Company; Gold Bond Hi-Impact Brand XP Wallboard.
 - c. USG Corporation; Fiberock Brand Panels--VHI Abuse-Resistant.
 - d. or approved equal.
- D. Backing Board For Wet Areas: One of the following products:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 1/2 inch.
 - b. Products:
 - 1) Custom Building Products; WonderBoard Lite Backerboard: www.custombuildingproducts.com.
 - 2) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com.
 - 3) USG Corporation; Durock Cement Board: www.usg.com.
 - 4) or approved equal.
 4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
 - a. Thickness: 1/2 inch.
 - b. Products:
 - 1) James Hardie Building Products, Inc; Hardiebacker Cement Board: www.jameshardie.com.
 - 2) or approved equal.
 5. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Standard Type: Thickness 1/2 inch.
 - b. Fire Resistant Type: Type X core, thickness 5/8 inch.
 - c. Products:
 - 1) Georgia-Pacific Gypsum; DensShield Tile Backer.
 - 2) National Gypsum Company; Gold Bond eXP Tile Backer.
 - 3) Temple-Inland Building Product by Georgia-Pacific, LLC; GreenGlass Tile Backer.
 - 4) or approved equal.
- E. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Type: Regular and Type X, in locations indicated.
 5. Type X Thickness: 5/8 inch.
 6. Regular Board Thickness: 5/8 inch.
 7. Edges: Tapered.
 8. Products:
 - a. American Gypsum Company; M-Bloc.

- b. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
 - c. Georgia-Pacific Gypsum; DensShield Tile Backer.
 - d. Lafarge North America Inc; Mold Defense Drywall.
 - e. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
 - f. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
 - g. or approved equal.
- F. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
- 1. Application: Ceilings, unless otherwise indicated.
 - 2. Thickness: 1/2 inch.
 - 3. Edges: Tapered.
 - 4. Products:
 - a. American Gypsum; Interior Ceiling Board.
 - b. CertainTeed Corporation; ProRoc Interior Ceiling.
 - c. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
 - d. Lafarge North America Inc; Sagcheck.
 - e. National Gypsum Company; High Strength Brand Ceiling Board.
 - f. USG Corporation; Sheetrock Brand Sag-Resistant Interior Gypsum Ceiling Board.
 - g. or approved equal.
- G. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
- 1. Application: Exterior sheathing, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 5. Core Type: Regular and Type X, as indicated.
 - 6. Type X Thickness: 5/8 inch.
 - 7. Regular Board Thickness: 5/8 inch.
 - 8. Edges: Square, for vertical application.
 - 9. Glass Mat Faced Products:
 - a. Continental Building Products; Weather Defense Platinum Exterior Sheathing.
 - b. Continental Building Products; Weather Defense Platinum Sheathing Type X.
 - c. Georgia-Pacific Gypsum; DensGlass Sheathing.
 - d. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.
 - e. USG; Securock Glas-Mat Regular Sheathing Board.
 - f. USG Securock Glas-Mat Firecode Sheathing Board.
 - g. or approved equal.
- H. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
- 1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 - 2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 4. Products:
 - a. American Gypsum Company; M-Bloc Shaft Liner.
 - b. National Gypsum Company; Gold Bond Brand 1" Fire-Shield Shaftliner XP (mold-resistant).

- c. Temple-Inland Building Products by Georgia-Pacific, LLC; GreenGlass Liner Panel.
- d. USG Corporation; Sheetrock Gypsum Liner Panels--Enhanced (mold-resistant).
- e. or approved equal.

2.05 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; mineral fiber, friction fit type, unfaced. Thickness: 2 inches.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Water-Resistive Barrier: As specified in Section 07 2505.
- D. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 - 3. Manufacturers - Finishing Accessories:
 - a. Same manufacturer as framing materials.
 - b. or approved equal.
- E. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Ready-mixed vinyl-based joint compound.
 - 3. Chemical hardening type compound.
- F. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- G. Screws for Attachment to Steel Members Less Than 0.033 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium plated for exterior locations.
- H. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.
- I. Nails for Attachment to Wood Members: ASTM C514.
- J. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- K. Exterior Soffit Vents: One piece, perforated, ASTM B221 6063 T5 alloy aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 GENERAL INSTALLATION

- A. Where feasible, one or both of the following procedures shall be used to minimize the exposure of gypsum wallboard to materials or finishes which have high short-term emissions of VOC's, formaldehyde, particulates, or other air-borne compounds:
1. The gypsum wall board shall be taped, spackled and primed before the installation of the highly-emitting materials.
 2. The gypsum wallboard shall be installed after the installation of the highly-emitting materials.
 3. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, 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.

3.03 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
 2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.04 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center.
1. Level ceiling system to a tolerance of 1/1200.
 2. Laterally brace entire suspension system.
 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs at 16 inches on center.
1. Extend partition framing to structure in all locations.
 2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
1. Orientation: Horizontal.
 2. Spacing: As indicated.

- F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- G. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.
- H. Blocking: Install mechanically fastened steel channel blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet partitions.
 - 5. Toilet accessories.
 - 6. Wall mounted door hardware.

3.05 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.06 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- F. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
- G. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

- H. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
- I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.07 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 - 2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.
- D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area specified.

3.08 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 3: Walls to receive textured wall finish.
 - 4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 - 6. Level 0: Temporary partitions.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.09 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.10 WASTE MANAGEMENT

- A. Identify manufacturer's policy for collection or return of construction scrap, unused material, demolition scrap, and/or packaging material. Where feasible, institute demolition and construction waste separation and recycling to take advantage of manufacturer's programs.

END OF SECTION

SECTION 09 2236.23 - METAL LATH

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. PLST-1: Metal lath for Portland cement and gypsum plaster.

1.03 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Sheathing on exterior walls.
- B. Section 07 2500 - Weather Barriers: Weather barrier under exterior plaster and stucco.
- C. Section 09 2400 - Portland Cement Plastering.

1.04 REFERENCE STANDARDS

- A. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2013).
- B. ASTM C847 - Standard Specification for Metal Lath; 2014a.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- D. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2014b.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lath:
1. Alabama Metal Industries Corporation: www.amico-lath.com.
 2. Cemco: www.cemcosteel.com.
 3. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 4. or approved equal.

2.02 FRAMING AND LATH ASSEMBLIES

- A. Provide completed assemblies with the following characteristics:
1. Maximum Deflection of Vertical Assemblies: 1:360 under lateral point load of 100 lbs.
 2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.

2.03 LATH

- A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
1. Weight: To suit application, comply with deflection criteria, and as specified in ASTM C841 for framing spacing.
 2. Weight: 3.4 lb/sq yd.
 3. Backed with treated paper.
- B. Corner Mesh: Formed sheet steel, minimum 0.018 inch thick, perforated flanges shaped to permit complete embedding in plaster, minimum 2 inch size; same finish as lath.
- C. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.
1. Material: Formed zinc, expanded metal flanges.
 2. Casing Beads: Square edges.
 3. Corner Beads: Radiused corners.
 4. Base Screeds: Bevelled edges.
 5. Expansion Joints: Accordion profile with factory-installed protective tape, 2 inch wide flanges.
 6. Control Joints: Accordion profile with protective tape, 2 inch flanges.

2.04 ACCESSORIES

- A. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- B. Fasteners: Self-piercing tapping screws; ASTM C1002.

- C. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that substrates are ready to receive work and conditions are suitable for application.
- C. For exterior plaster and stucco on stud walls, verify that weather barrier has been installed over sheathing substrate completely and correctly.
- D. Do not begin until unacceptable conditions have been corrected.
- E. If substrate preparation is the responsibility of another installer, notify Commissioner of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

- A. Install lath and furring for Portland cement plaster in accordance with ASTM C1063.

3.03 CONTROL AND EXPANSION JOINTS

- A. Locate joints as indicated on drawings.

3.04 LATH INSTALLATION

- A. Apply metal lath taut, with long dimension perpendicular to supports.
- B. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.
- C. Lap sides of diamond mesh lath minimum 1-1/2 inches.
- D. Attach metal lath to metal supports using tie wire at maximum 6 inches on center.
- E. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.
- F. Place corner bead at external wall corners; fasten at outer edges of lath only.
- G. Place base screeds at termination of plaster areas; secure rigidly in place.
- H. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.
- I. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.
- J. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

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K. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

END OF SECTION

SECTION 09 2400 - PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. PLST-1: Portland cement plaster for installation over metal lath.

1.03 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Structural metal framing for plaster.
- B. Section 09 2236.23 - Metal Lath: Metal furring and lathing for plaster.

1.04 REFERENCE STANDARDS

- A. ASTM C206 - Standard Specification for Finishing Hydrated Lime; 2003 (Reapproved 2009).
- B. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- C. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2014a.
- D. PCA EB049 - Portland Cement Plaster/Stucco Manual; Portland Cement Association; 2003.
- E. Technical Services Information Bureau; Plaster Assemblies Manual "Online": www.tsib.org.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittals procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data on plaster materials, characteristics and limitations of products specified.
- D. Samples: Submit two samples, 18x36 inch in size illustrating finish color and texture.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years documented experience.

1.08 MOCK-UP

- A. Construct mock-up of exterior wall, 4 feet long by 8 feet wide, illustrating surface finish.
- B. Mock-up may remain as part of the Work.

1.09 FIELD CONDITIONS

- A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F or over 80 degrees F.
- B. Maintain minimum ambient temperature of 50 degrees F during installation of plaster and until cured.

PART 2 PRODUCTS

2.01 PORTLAND CEMENT PLASTER ASSEMBLIES

- A. Exterior Stucco: Portland cement plaster system, made of finish, brown, and scratch coat and reinforcing mesh.
 - 1. Provide continuous exterior insulation as part of the system. See Section 07 2100 - Thermal Insulation.
 - 2. Provide weather resistive barrier and air barrier as part of the system.

2.02 METAL LATH

- A. Metal Lath and Accessories: As specified in Section 09 2236.23.
- B. Beads, Screeds, and Joint Accessories: As specified in Section 09 2236.23.

2.03 PLASTER MIXES

- A. Over Metal Lath: Three-coat application, mixed and proportioned in accordance with manufacturer's instructions.
- B. Premixed Plaster Materials: Mix in accordance with manufacturer's instructions.
- C. First Coat over Metal Lath:
 - 1. One part Portland cement.
 - 2. Minimum 0 and maximum 3/4 part hydrated lime.

3. Minimum 2-1/2 and maximum 4 parts aggregate, per sum of cementitious materials.
- D. First Coat:
 1. One part Portland cement.
 2. Minimum 3/4 and maximum 1-1/2 part hydrated lime.
 3. Minimum 2-1/2 and maximum 4 parts aggregate, per sum of cementitious materials.
- E. Finish Coat:
 1. One part Portland cement.
 2. Minimum 3/4 and maximum 1-1/2 parts lime.
 3. 3 parts sand, per sum of cementitious materials.
- F. Mix only as much plaster as can be used prior to initial set.
- G. Mix materials dry, to uniform color and consistency, before adding water.
- H. Protect mixtures from freezing, frost, contamination, and excessive evaporation.
- I. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify the suitability of existing conditions before starting work.
- B. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.
- C. Mechanical and Electrical: Verify services within walls have been tested and approved.

3.02 PLASTERING

- A. Apply plaster in accordance with ASTM C926.
- B. Three-Coat Application Over Metal Lath:
 1. Apply first coat to a nominal thickness of 3/8 inch.
 2. Apply second coat to a nominal thickness of 3/8 inch.
 3. Apply finish coat to a nominal thickness of 1/8 inch.
- C. Moist cure base coats.
- D. Apply second coat immediately following initial set of first coat.
- E. After curing, dampen previous coat prior to applying finish coat.
- F. Finish Texture: Float to a consistent and smooth finish.
- G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.
- H. Moist cure finish coat for minimum period of 48 hours.

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3.03 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 3000 - TILING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. CT-1: Tile for wall applications.
- B. Cementitious backer board as tile substrate.
- C. Coated glass mat backer board as tile substrate.
- D. Ceramic trim.
- E. Criteria for post-consumer and/or post-industrial recycled content.

1.03 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Installation of tile backer board.
- B. Section 22 4000 - Plumbing Fixtures: Shower receptor.

1.04 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.
- B. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2013.1.
- C. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2013.1.
- D. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2013.1.
- E. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.1.
- F. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.
- G. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2013.1.

- H. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.
- I. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.
- J. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2013.1.
- K. ANSI A137.1 - American National Standard Specifications for Ceramic Tile - Version; 2013.1.
- L. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation - Version; 2013.1.
- M. Green Seal Environmental Standard for Certification of Commercial Adhesives (GS-36), Green Seal, Inc., Washington, DC, <http://www.greenseal.org>

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- D. Manufacturer's certification of recycled content per section 2.01 of this specification.
- E. Manufacturer's certification of lead-free glazings (for glazed tiles) per section 2.01 of this specification.
- F. Manufacturer's certification of product compliance with adhesive standards per section 2.01 of this specification (for mastic-set applications).
- G. Manufacturer's certification of product compliance with VOC limits for mortars and grouts per section 2.01 of this specification.
- H. Manufacturer's policy statement on ceramic tile recycling programs.
- I. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- J. Service Materials: Furnish the following for Commissioner's use in service of project.
 - 1. See DDC General Conditions for additional provisions.
 - 2. Extra Tile: 10 percent of each size, color, and surface finish combination.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Installer Qualifications: Company specializing in performing tile installation, with minimum of 3 years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Environmental Criteria:
 - 1. Recycled Content:
 - a. Ceramic, glass, ceramic/glass composite, and terrazzo-type tiles shall contain a minimum of 50% (combined) post-industrial/post-consumer recycled content. The percentage of recycled content is based on the weight of the component materials.
 - 2. Hazardous Materials Content:
 - a. Glazings used for glazed tiles shall be lead-free.
 - 3. Adhesives:
 - a. Tile adhesives in mastic-set applications shall meet the VOC limits and prohibited chemical limitations of the "Green Seal Environmental Standard for Certification of Commercial Adhesives" (GS-36), of Green Seal, Inc., Washington, DC.
 - 4. Mortars/Grouts:
 - a. The VOC content of mortars or grouts for ceramic tile installations shall not be in excess of 150 grams/liter, less water and less exempt compounds.

2.02 TILE

- A. Manufacturers: All products by the same manufacturer.
 - 1. American Olean Corporation: www.americanolean.com.
 - 2. Dal-Tile Corporation: www.daltile.com.
 - 3. Crossville, Inc: www.crossvilleinc.com.
 - 4. or approved equal.
- B. Ceramic Mosaic Tile: ANSI A137.1, and as follows:
 - 1. Size and Shape: 1 inch square.
 - 2. Edges: Square.
 - 3. Color(s): 4 Color Mosaic To be selected by Commissioner from manufacturer's full range..
 - 4. Mounted Sheet Size: 12x12 inches.

2.03 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
 - 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base.
 - 2. Manufacturers: Same as for tile.

2.04 SETTING MATERIALS

- A. Provide setting materials made by the same manufacturer as grout.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
 - 1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
 - 2. Products:
 - a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: www.ardexamericas.com.
 - b. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com.
 - c. Mapei; Kerabond/Keralastic System: www.mapei.com.
 - d. or approved equal.

2.05 GROUTS

- A. Manufacturers:
 - 1. ARDEX Engineered Cements: www.ardexamericas.com.
 - 2. LATICRETE International, Inc: www.laticrete.com.
 - 3. Mapei: www.mapei.com.
 - 4. or approved equal.
- B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
 - 1. Applications: Where indicated.
 - 2. Color(s): As selected by Commissioner from manufacturer's full line.
 - 3. Products:
 - a. ARDEX Engineered Cements; ARDEX WA: www.ardexamericas.com.
 - b. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com.
 - c. Mapei; Kerapoxy: www.mapei.com.
 - d. or approved equal.

2.06 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
 - 1. Thickness: 20 mils, maximum.
 - 2. Crack Resistance: No failure at 1/16 inch gap, minimum.

- B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 - 1. Products:
 - a. COMPOTITE Corporation; Composeal Gold: www.compotite.com.
 - b. Mapei: www.mapei.com.
 - c. Noble Company; NobleSeal TS: www.noblecompany.com.
 - d. or approved equal.
- C. Waterproofing Membrane at Showers and Tiled Tubs: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 - 1. Type: Trowel-applied.
 - 2. Material: Synthetic rubber.
 - 3. Thickness: 25 mils, minimum, dry film thickness.
 - 4. Products:
 - a. AVM Industries, Inc; System 750 (AVM Yellow) with polyester fabric reinforcing at edges, corners, joints, and cracks: www.avmindustries.com.
 - b. LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com.
 - c. Merkrete, by Parex USA, Inc.; Merkrete Hydro Guard 2000: www.merkrete.com.
 - d. or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

- D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- E. Install tile backer board in strict accordance with manufacturer's instructions, using corrosion-resistant bugle head drywall screws. Bed fiberglass self-adhesive tape at all joints and corners with material used to set tiles.

3.03 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep control and expansion joints free of mortar, grout, and adhesive.
- H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- I. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Use uncoupling membrane under all tile unless other underlayment is indicated.
 - 2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.
 - 3. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.

3.05 INSTALLATION - SHOWERS AND BATHTUB WALLS

- A. At shower walls install in accordance with The Tile Council of North America Handbook Method B412, over cementitious backer units with waterproofing membrane.
- B. Grout with latex-Portland cement grout.

3.06 INSTALLATION - WALL TILE

- A. Over cementitious backer units install in accordance with TCNA (HB) Method W223, organic adhesive.

- B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.
- C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.07 WASTE MANAGEMENT

- A. Identify manufacturer's policy for collection or return of construction scrap, unused material, demolition scrap, and/or packaging material. Where feasible, institute demolition and construction waste separation and recycling to take advantage of manufacturer's programs.

3.08 CLEANING

- A. Clean tile and grout surfaces.

3.09 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

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SECTION 09 5153 - DIRECT-APPLIED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Seamless sound absorbing plaster ceiling system - AC-1.
- B. Perimeter trim.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- C. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- D. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

1.04 SYSTEM DESCRIPTION

- A. Seamless, direct-applied two coat gypsum based acoustical plaster ceiling system.
 - 1. 25mm thickness

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.

- C. Product Data: Provide data on acoustic units.
- D. Samples: Submit two samples, 12 by 12 inch in size, illustrating material and finish.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of documented experience.

1.08 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustical Plaster:
 - 1. USG: www.usg.com.
 - 2. Fellert North America: www.fellertna.com.
 - 3. BASWA Acoustic: www.baswaphon.com.
 - 4. or approved equal.

2.02 ACOUSTICAL FINISH SYSTEM

- A. Acoustical Plaster System: Spray-applied and hand troweled, sound absorbing plaster, 2-coat system composed of cotton fiber and perlite.
 - 1. Plaster:
 - a. Total Plaster Dry Thickness: 3 mm (0.125 inch).
 - b. Finish: Silk (smooth).
 - 2. Perimeter C-Channel: Plastic.
 - 3. Acoustical Board: 25 mm (1 inch) 6 lb density sound absorbing, fiberglass board.
 - 4. Adhesive: Manufacturer's recommend adhesive.
 - 5. Primer: Manufacturer's recommended primer.
 - 6. Coating: Manufacturer's recommended coating.
 - a. Total Coating Dry Thickness: approx. 1 mil.
 - b. Color: To match Architect's sample.
- B. Accessories: As recommended by manufacturer.
- C. Water: Clean potable water, free of mineral or organic matter.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION

- A. General: Apply the acoustical finish system per manufacturer's installation guide and ASTM C1396.
- B. Provide plastic C-channel reveal between acoustic plaster system and adjoining finish system. Secure C-channel to studwork.
- C. Apply adhesive to acoustical board evenly and adhere to drywall substrate. Allow 24 hours to dry prior to any sanding.
- D. Apply self-adhesive mesh tape and primer to the intersection of C channel and acoustical board and gypsum drywall rippers. Allow 24 hours to dry prior to plaster application.
- E. Sand the acoustical board.
- F. Spray and trowel one coat of plaster. Allow to dry 2 to 3 days prior to lightly sanding.
- G. Spray and trowel one coat of plaster to match approved mockup. Do not sand final coat. Allow to dry at least 4 hours prior to coating application.
- H. Spray-apply coating to match approved mockup.

3.03 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

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FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

DIRECT-APPLIED ACOUSTICAL
CEILINGS
09 5153 - 4

SECTION 09 5423 - LINEAR METAL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Linear, formed metal ceiling panels.
- B. Supplementary acoustical insulation over system units.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- E. ASTM C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- F. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- G. ASTM E580/E580M - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 2014.

1.04 DESIGN REQUIREMENTS

- A. Design components to ensure light fixtures will not induce eccentric loads. Where components may induce rotation of ceiling system components, provide stabilizing reinforcement.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this section with installation of mechanical and electrical components and with other construction activities affected by work of this section.
- B. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Furnish for component profiles.
- D. Shop Drawings: Indicate reflected plan.
- E. Samples: Submit two samples 12x24 inch in size illustrating color and finish of exposed to view components.
- F. Service Materials: Furnish the following for Commissioner's use in service of project.
 - 1. See DDC General Conditions for additional provisions.
 - 2. Extra Linear Panels: Ten, standard lengths.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc..

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept factory-finished products on site in manufacturer's unopened factory packaging only; reject opened packages.
- B. Protect factory-finished products from damage to appearance by storing products in manufacturer's unopened factory packaging in dry storage area.

1.09 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Provide five year manufacturer warranty; include coverage for corrosion resistance and discoloration of surface finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Linear Metal Ceilings:
 - 1. Hunter Douglas Contract; Luxalon Linear Ceiling System: www.hunterdouglascontract.com.
 - 2. Roxul Inc; Rockfon Planar Linear Ceilings: www.rockfon.com.

3. USG; Paraline Linear Metal Ceiling System: www.usg.com.
4. or approved equal.

2.02 LINEAR METAL CEILING

- A. Linear Metal Ceiling and Soffit System: Panels, suspension members, trim and accessories as required to provide a complete system.
- B. Performance Requirements:
 1. Design to support imposed loads of indicated items without eccentric loading of supports.
 2. Design for maximum deflection of 1/360 of span.

2.03 COMPONENTS

- A. Linear Panels:
 1. Material: Aluminum sheet, ASTM B209 (ASTM B209M).
 2. Profile: Channel shape, Nominal 3 inch wide.
 3. Edge: Square.
 4. Length: Equal.
 5. Sight-exposed Surface Finish: Anodized finish; of selected color from manufacturer's standard range.
- B. Suspension Members: Formed steel sections, with integral attachment points; galvanized finish; size and type to suit application and ceiling system flatness requirement specified.
- C. Suspension Wire: Steel, annealed, galvanized finish, 9 gage, 0.1144 inch diameter.
- D. Subgirt Members: Prime painted steel sheet, formed to resist imposed loads and to provide attachment for linear panels and accessories.
- E. Insulation: ASTM C665, preformed mineral fiber batt; friction fit, conforming to the following:
 1. Facing: Unfaced.

2.04 FABRICATION

- A. Shop cut linear panels to accommodate mechanical and electrical items.
- B. Factory-form internal and external corners of same material, thickness, finish, and profile to match exposed linear panels; back brace internal corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Verify that required utilities are available, in proper location, and ready for use.

- D. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Suspension Components:
 - 1. Install after above-ceiling work is complete in accordance with manufacturer's instructions, ASTM C636/C636M, and ASTM E580/E580M.
 - 2. Hang carrying members independent of walls, columns, ducts, light fixtures, pipe, and conduit; where carrying members are spliced, avoid visible displacement of face panels with adjacent panels.
 - 3. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest adjacent hangers to span the required distance.
 - 4. Locate suspension system for linear panel layout on room axis according to reflected plan.
- B. Linear Panels:
 - 1. Install linear panels and other system components in accordance with manufacturer's instructions.
 - 2. Stagger end joints minimum 12 inches.
 - 3. Butt interior end joints tight.
 - 4. Field miter corners at changes in panel direction.
 - 5. Exercise care when site cutting sight-exposed finished components to ensure surface finish is not defaced.
- C. Insulation: Install above panel members; fit tight between grid members .

3.03 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.
- C. Maximum Variation From Dimensioned Position: 1/4 inch.

3.04 CLEANING

- A. Clean polished surfaces.
- B. Replace damaged or abraded components.

END OF SECTION

SECTION 09 6429 - WOOD STRIP AND PLANK FLOORING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. **WD-1:** Wood plank flooring, nailed.
- B. Secondary subflooring.
- C. Surface finishing.
- D. Requirements for volatile organic compound (VOC) content in polyurethanes and varnishes.

1.03 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete subfloor surface; recessed.
- B. Section 06 1000 - Rough Carpentry: Wood overlay subfloor surface.

1.04 REFERENCE STANDARDS

- A. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems; Maple Flooring Manufacturers Association; current edition.
- B. NWFA (IG) - Installation Guidelines; National Wood Flooring Association; current edition located at www.nwfa.org.
- C. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.
- D. South Coast Air Quality Management District Rule #1113 - Architectural Coatings, amended 5/14/99, South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data for flooring and floor finish materials.

- D. Manufacturer's certification of product compliance with polyurethane and varnish requirements per section 2.02 of this specification.
- E. Adhesives: For each adhesive used, documentation indicating that the adhesive contains no added urea formaldehyde.
- F. Shop Drawings: Indicate floor joint pattern and termination details.
 - 1. Indicate provisions for expansion and contraction.
- G. Samples: Submit two samples 24 x 24 inch in size illustrating floor finish, color, and sheen.
- H. Service Materials: Furnish the following for Commissioner's use in service of project.
 - 1. See DDC General Conditions for additional provisions.
 - 2. Extra Flooring Material: 10 square yards matching installed flooring.

1.06 QUALITY ASSURANCE

- A. Perform work of this section in accordance with MFMA (SPEC) and NWFA (IG).
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing work of this section with minimum 3 years experience.

1.07 FIELD CONDITIONS

- A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40 percent.
- B. Provide heat, light, and ventilation prior to installation.
- C. Store materials in area of installation for minimum period of 24 hours prior to installation.
- D. Maintain minimum room temperature of 65 degrees F for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

1.08 DELIVERY AND STORAGE

- A. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.
- B. Deliver wood flooring materials in unopened cartons or bundles.
- C. Wood flooring to be stored per manufacturer's recommendations for allowable temperature and humidity range. Flooring shall not be allowed to become damp.
- D. To the extent feasible, do not store polyurethane or varnish products with materials that have a high capacity to adsorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpet, textiles, etc.). Do not store polyurethane or varnish products in occupied spaces.
- E. Do not acclimate (open packages) prior to installation.

PART 2 PRODUCTS

2.01 ENVIRONMENTALLY-PREFERABLE PRODUCT CRITERIA:

- A. Polyurethanes and Varnishes:
 - 1. The volatile organic compound (VOC) content of polyurethane or varnish products shall not exceed 275 grams/liter, less water and less exempt compounds (as determined by U.S. EPA Reference Test Method 24).

2.02 MATERIALS

- A. Wood Strip Flooring - Type WD-1:
 - 1. Species: Walnut.
 - 2. Grade: First.
 - 3. Cut: Flat grain.
 - 4. Moisture Content: 7 to 9 percent.
 - 5. Actual Thickness: 25/32 inch.
 - 6. Actual Width: 3-1/4 inches.
 - 7. Edge: Tongue and Groove.
 - 8. Length: Random, minimum of 36 inches.
 - 9. Composite Wood products shall not contain added urea formaldehyde.
- B. Flooring Nails: Type recommended by flooring manufacturer.
- C. Secondary Subflooring: 23/32 inch thick plywood, APA Rated Sheathing, Span Rating of 240C with square edges; Exposure 1.
- D. Sheathing Paper: Plain building paper.

2.03 ACCESSORIES

- A. Wood Base: Same species as flooring; profile as indicated.
- B. Transition Strip: Same species and finish as flooring material; profiles indicated.
- C. Floor Finish: Polyurethane, to achieve satin sheen surface; type recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/4 inch in 10 feet.

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- C. Verify wood subfloor is properly secured, smooth and flat to plus or minus 1/4 inch in 10 feet.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Secondary Subflooring: Place plywood subflooring over structural slab shimmed such that top of finish wood floor will align flush with top of adjacent dissimilar flooring surface.
 - 1. Adjust shims beneath subflooring to achieve level line of plus or minus 1/4 inch in 10 feet.
 - 2. Lay subflooring perpendicular to shims with end joints over shims.
 - 3. Anchor subfloor to concrete substrate with explosive driven concrete nails; place nails at 16 inches on center.
- B. Prepare substrate to receive wood flooring in accordance with manufacturer's, MFMA, and NWFA instructions.
- C. Broom clean substrate.

3.03 INSTALLATION

- A. Comply, at minimum, with polyurethane or varnish manufacturer recommendations for space ventilation during and after installation. Where feasible, the following ventilation conditions shall be maintained during the polyurethane or varnish curing period, or for 72 hours after installation:
 - 1. Supply 100% outside air 24 hours a day.
 - 2. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%.
 - 3. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in item 2 above.
- B. To the extent practical, allow polyurethane or varnish installations to cure prior to the installation of materials that adsorb VOCs. Materials that adsorb VOCs include carpets, textiles, unprimed gwb, and acoustical ceiling panels.
- C. Sheathing Paper: Place over wood subfloor; lap edges and ends 2 inches, staple in place.
- D. Wood Flooring:
 - 1. Install in accordance with manufacturer's, MFMA, and NWFA instructions; predrill and blind nail to wood sub-floor.
 - 2. Lay flooring parallel to length of room areas. Verify alignment as work progresses.
 - 3. Arrange flooring with end matched grain set flush and tight.
 - 4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated.
 - 5. Install edge strips at unprotected or exposed edges, and where flooring terminates.
 - 6. Secure edge strips before installation of flooring with stainless steel screws.
 - 7. Install flooring tight to floor access covers.
 - 8. Provide 3/8 inch expansion space at fixed walls and other interruptions.
- E. Install base at floor perimeter to cover expansion space as indicated on the drawings. See Sheet A-602. Miter inside and outside corners.

F. Finishing:

1. Mask off adjacent surfaces before beginning sanding.
2. Sand flooring to smooth even finish with no evidence of sander marks. Take precautions to contain dust. Remove dust by vacuum.
3. Apply finish in accordance with floor finish manufacturer's and MFMA instructions.
4. Apply first coat, allow to dry, then buff lightly with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth before applying succeeding coat.
5. Lightly buff between coats with steel wool and vacuum clean before applying succeeding coat.
6. Apply last coat of finish.

3.04 CLEANING

- A. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.

3.05 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Place protective coverings over finished floors; do not remove coverings until Substantial Completion.

END OF SECTION

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SECTION 09 6500 - RESILIENT WALL BASE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. RB-1: Resilient base.
- B. Installation accessories.

1.03 REFERENCE STANDARDS

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 [Reapproved 2012]e1.
- B. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- D. Selection Samples: Submit manufacturer's complete set of color samples for Commissioner's initial selection.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 RESILIENT BASE - RB-1

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
1. Height: 4 inch.
 2. Thickness: 0.125 inch thick.
 3. Finish: Satin.
 4. Length: Roll.
 5. Color: as selected by Commissioner from manufacturer's full range of samples..
 6. Accessories: Premolded external corners, internal corners, and end stops.
 7. Recovered Post-Consumer Materials Content: 90 - 100% per NYC EPP, 2012.
 8. Manufacturers:
 - a. Burke Flooring: www.burkemercer.com.
 - b. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - c. Roppe Corp: www.roppe.com.
 - d. or approved equal.

2.02 ACCESSORIES

- A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
1. VOC Content Limits:
 - a. Primers, Sealers and Undercoaters shall have a maximum VOC content of 200 grams per liter per NYC EPP, 2012.
- B. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

3.02 PREPARATION

- A. Clean substrate.
- B. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.

3.04 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.
- C. Scribe and fit to door frames and other interruptions.

3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.

3.06 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

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SECTION 09 6566 - RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. RB-2: Interlocking, loose-laid rubber tile.
- B. Accessories.

1.03 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- B. Section 09 6500 - Resilient Wall Base.

1.04 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).
- B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. GEI (SCH) - GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.
- E. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scs-certified.com.
- F. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Manufacturer's printed data sheets for products specified.

- D. Selection Samples: Manufacturer's color charts for flooring materials specified, indicating full range of colors and textures available.
- E. Verification Samples: Actual flooring material specified, not less than 12 inch square.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer properly trained by the flooring manufacturer to be qualified for installation of specified flooring system.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.08 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

- A. Manufacturers: All products by the same manufacturer.
 - 1. Ecore Commercial Flooring: www.ecorecommercialflooring.com
 - 2. No Fault Sport Group: www.nofault.com.
 - 3. Robbins Sports Surfaces: www.robbinsfloor.com.
 - 4. or approved equal.
- B. Rubber Tile Flooring: Recycled rubber material formed into square tiles with invisible interlocking tabs, free-laid without adhesive.
 - 1. Thickness: Minimum 1/4 in.
 - 2. Size: Nominal 24 in square.
 - 3. Tensile Strength: Minimum 150 psi, per ASTM D412.
 - 4. Surface Texture: Smooth.
 - 5. Color: As selected from manufacturer's standards.
 - 6. Minimum Post-Consumer Recovered Content: 90 - 100%

2.02 ACCESSORIES

- A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
- B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.
- B. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations and approved shop drawings.
- C. Rubber Tile Flooring:
 - 1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
 - 2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.

3.04 CLEANING

- A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION

- A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION

SECTION 09 9000 - PAINTING AND COATING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and other coatings.
- C. Materials for backpriming woodwork.
- D. Requirements for reduced emission, reduced toxicity interior paints (primers & top coats) and anti-corrosive paints for metal in interior applications.
- E. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Elevator pit ladders.
 - 3. Exposed surfaces of steel lintels and ledge angles.
 - 4. Surfaces inside cabinets.
 - 5. Prime surfaces to receive wall coverings.
 - 6. Mechanical and Electrical:
 - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In all areas, paint shop-primed items.
 - c. On the roof and outdoors, paint all equipment that is exposed to weather or to view, including that which is factory-finished.
 - d. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - e. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- F. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.

5. Non-metallic roofing and flashing.
6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
7. Marble, granite, slate, and other natural stones.
8. Floors, unless specifically so indicated.
9. Ceramic and other tiles.
10. Brick, Architectural concrete, cast stone, integrally colored plaster and stucco.
11. Exterior insulation and finish system (EIFS).
12. Glass.
13. Acoustical materials, unless specifically so indicated.
14. Concealed pipes, ducts, and conduits.

1.03 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Shop-primed items.

1.04 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.05 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- D. Green Seal Environmental Standard for Paints (GS-11), Green Seal, Washington, DC, www.greenseal.org
- E. Green Seal Environmental Standard for Anti-Corrosive Paints (GC-03), Green Seal, Washington, DC, www.greenseal.org
- F. SSPC [PM1] - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Manufacturer's certification of product compliance with paint standards (VOC content and prohibited compounds) per section 2.01 of this specification.
- D. Product Data: Provide complete list of all products to be used, with the following information for each:
1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").

2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 3. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- E. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
 2. Where sheen is not specified, discuss sheen options with Commissioner before preparing samples, to eliminate sheens definitely not required.
 3. Allow 10 business days for approval process, after receipt of complete samples by Commissioner.
 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals, wood cabinets, and wood doors, have been approved.
- F. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.
- G. Manufacturer's Instructions: Indicate special surface preparation procedures.
- H. Product and Service Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and coated surfaces, and color samples of each color and finish used.
- I. Service Materials: Furnish the following for Commissioner's use in service of project.
1. See DDC General Requirements for additional provisions.
 2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 3. Label each container with color in addition to the manufacturer's label.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- D. To the extent feasible, do not store paint products with materials that have a high capacity to adsorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpet, textiles, etc.). Do not store paint products in occupied spaces.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2. PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Commissioner is obtained using the specified procedures for the approved equal.
 - 2. The approved equal of other products by the same manufacturer is preferred over the approved equal of products by a different manufacturer.
- B. Paints:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com.
 - 2. Pratt & Lambert Paints: www.prattandlambert.com.
 - 3. Sherwin-Williams Company: www.sherwin-williams.com.
 - 4. Monopole Inc: www.monopoleinc.com.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Block Fillers: Same manufacturer as top coats.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

3. Supply each coating material in quantity required to complete entire project's work from a single production run.
 4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Commissioner from the manufacturer's full line.
- D. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Commissioner after award of contract.
 2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to City of New York.
 3. Extend colors to surface edges; colors may change at any edge as directed by Commissioner.
 4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
 5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color schedule.
- E. VOC Content of Paints:
1. The volatile organic compound (VOC) content of interior paints, interior primers, and anti-corrosive paints used in interior applications shall not exceed the limits defined in the Green Seal Environmental Standards for Paints (GS-11, dated 5/20/93) and Anti-Corrosive Paints (GC-03, dated 1/7/97), of Green Seal, Washington, DC. The VOC limits defined in the referenced Green Seal standards are as follows. All VOC limits are defined in grams per liter, and exclude water and tinting color added at the point of sale (as determined by U.S. EPA Reference Test Method 24).
 - a. Clear Wood Coatings - Varnishes: 275 grams per liter
 - b. Flat Paint: 50 grams per liter
 - c. Nonflat High-Gloss Coatings: 250 grams per liter
 - d. Nonflat Paint: 150 grams per liter
 - e. Primers for Flat Paint: 50 grams per liter
 - f. Primers for Nonflat Paint: 150 grams per liter
 - g. Other primers, Sealers and Undercoaters: 200 grams per liter
- F. Additional Chemical Component Restrictions in Paints:
1. To the extent feasible, interior paints, interior primers, and anti-corrosive paints used in interior applications shall comply with the following chemical component restrictions of the Green Seal Environmental Standards for Paints (GS-11, dated 5/20/93) and Anti-Corrosive Paints (GC-03, dated 1/7/97), of Green Seal, Washington, DC.
 - a. Aromatic Compounds: the product must contain no more than 1.0% by weight of the sum total of aromatic compounds. Testing for the concentration of these compounds will be performed if they are determined to be present in the product during a materials audit.
 - b. Other Chemicals: the manufacturer shall demonstrate that the following chemical compounds are not used as ingredients in the manufacture of the product.
 - 1) Halomethanes: methylene chloride
 - 2) Chlorinated ethanes: 1,1,1-trichloroethane
 - 3) Aromatic solvents: benzene, toluene (methylbenzene), ethylbenzene

- 4) Chlorinated ethylenes: vinyl chloride
- 5) Polynuclear aromatics: naphthalene
- 6) Chlorobenzenes: 1,2-dichlorobenzene
- 7) Phthalate esters: di (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, dimethyl phthalate
- 8) Miscellaneous semi-volatile organics: isophorone
- 9) Metals and their compounds: antimony, cadmium, hexavalent chromium, lead, mercury
- 10) Preservatives (antifouling agents): formaldehyde
- 11) Ketones: methyl ethyl ketone, methyl isobutyl ketone
- 12) Miscellaneous volatile organics: acrolein, acrylonitrile

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-TR-C - Transparent Finish on Precast Concrete Walls, Unless Otherwise Indicated:
 1. 2 coats sealer.
 2. Transparent Silane Sealer for Concrete Walls, Clear, Flat, Non-Yellowing; MPI #58.
 3. Indicated on the drawings as PT-1.
- B. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
 1. One coat of alkyd primer.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-4.
- C. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-4.
- D. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
 1. One coat galvanize primer.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-4.
- E. Paint E-Pav - Pavement Marking Paint:
 1. Yellow: One coat, with reflective particles .

2.04 PAINT SYSTEMS - INTERIOR

- A. Paint I-TR-FL - Transparent Finish on Wood Floors:
 1. 2 top coats.
 2. Top Coat(s): Polyurethane Varnish, Oil Modified; MPI #56, 57.
 3. Satin: MPI gloss level 4; use this sheen at all locations.
- B. Paint I-TR-C - Transparent Finish on Concrete , Unless Otherwise Indicated:
 1. 2 coats sealer.
 2. Transparent Sealer for Concrete, Clear, Flat, Non-Yellowing; MPI #58.
 3. Indicated on the drawings as PT-1.
- C. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
 1. One coat of latex primer sealer.

2. Semi-gloss: Two coats of latex enamel.
 3. Indicated on the drawings as PT-3.
- D. Paint CI-OP-3A - Concrete/Masonry, Opaque, Alkyd, 3 Coat:
1. One coat of block filler.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-2.
- E. Paint MI-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-5.
- F. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
1. Touch-up with alkyd primer.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-5.
- G. Paint Mgl-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
 2. Semi-gloss: Two coats of alkyd enamel.
 3. Indicated on the drawings as PT-5.
- H. Paint GI-OP-2L - Gypsum Board/Plaster, Latex, 2 Coat:
1. One coat of alkyd primer sealer.
 2. Flat: One coat of latex enamel; Ceilings.
 3. Indicated on the drawings as PT-3.
- I. Paint GI-OP-3LA - Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:
1. One coat of alkyd primer sealer.
 2. Eggshell: Two coats of latex-acrylic enamel; Walls.
 3. Indicated on the drawings as PT-3.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Plaster and Stucco: 12 percent.
 - 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 - 5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- J. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- K. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- L. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

- M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- N. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- O. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- P. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- Q. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.
- R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Comply, at minimum, with paint manufacturer recommendations for space ventilation during and after installation. Where feasible, the following ventilation conditions shall be maintained during the paint curing period, or for 72 hours after application:
 - 1. Supply 100% outside air 24 hours a day.
 - 2. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%.
 - 3. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in item 2 above.
- B. To the extent practical, allow paint installations to cure prior to the installation of materials that adsorb VOCs. Materials that adsorb VOCs include carpets, textiles, and acoustical ceiling panels.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- D. Apply products in accordance with manufacturer's instructions.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance.
- G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- H. Sand wood and metal surfaces lightly between coats to achieve required finish.
- I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- J. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

- K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 10 1101 - VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Markerboards.

1.02 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Visual Display Boards:
 - 1. MooreCo, Inc: www.moorecoinc.com.
 - 2. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
 - 3. Polyvision Corporation (Nelson Adams): www.polyvision.com.
 - 4. or approved equal.

2.02 VISUAL DISPLAY BOARDS

- A. Markerboards: Porcelain enamel on steel, laminated to core.
 - 1. Color: As selected from manufacturer's full range.
 - 2. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
 - 3. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
 - 4. Backing: Aluminum foil, laminated to core.
 - 5. Size: As indicated on drawings.
 - 6. Frame: Extruded aluminum, with concealed fasteners.
 - 7. Frame Finish: Anodized, natural.
 - 8. Accessories: Provide chalk tray.

2.03 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- C. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

2.04 ACCESSORIES

- A. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.
- B. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on a metal plate fastened to perimeter frame near chalkrail.
- C. Mounting Brackets: Concealed.

PART 3. EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install with bottom of perimeter frame at 30 inches above finished floor.
- C. Secure units level and plumb.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION

SECTION 10 1400 - SIGNAGE

PART 1. GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Luminous egress path marking and other "glow-in-the-dark" signs.
- D. Emergency evacuation maps.
- E. Building identification signs.
- F. Fuel tank signage.
- G. Emergency Generator signs.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).
- D. ASTM E2072 - Standard Specification for Photoluminescent (Phosphorescent) Safety Markings; 2014.
- E. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.
- F. NYC DEC, EPA 40 CFR Parts 280 and 281, API

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.

- C. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- D. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from City of New York through Commissioner at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by City of New York through Commissioner prior to fabrication.
- E. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- G. Verification Samples: Submit samples showing colors specified.
- H. Service Materials: Furnish the following for Commissioner's use in service of project.
 - 1. See DDC General Conditions for additional provisions.
 - 2. Curved Sign Media Suction Cups: Two; for removing media.

1.05 QUALITY ASSURANCE

- A. Field measure and survey all site conditions prior to fabrication.
- B. All work shall be constructed as complete systems, including all stiffeners, fasteners, welding, sealants, jointing, miscellaneous pieces and material thicknesses and connections required to enable the work to function properly.
- C. Confer with the Commissioner regarding all critical items before shop drawings are started, and advise the Commissioner of any significant discrepancies in field measurements or operational difficulties prior to fabrication. Obtain the Commissioner's written approval for any resulting deviations from the specifications and/or drawings that may become necessary.
- D. Work shall be performed by competent workmen and shall be of the best quality, free from defects impairing strength, durability and appearance. All items shall be made of new materials.
- E. Methods of fabrication, joining, finishing and installation of all components and work shall be according to the manufacturer's instructions for the use of any products, materials, fittings and equipment used in their construction.
- F. Connections, angles, shapes and details are suggestive and are to be sized, reinforced and detailed as required for their particular application. Details not shown are to be at least equal in quality to those detailed. All details of construction are to be engineered with appropriate strength materials and finished to withstand the potential rigors of their installed locations. The Contractor shall be responsible for the structural stability of all signs and their mountings and anchorages.
- G. All work shall be uniform in detail design and finish.

- H. During the course of contract the Contractor shall provide access, during normal working hours, to the Architect to inspect all work in progress at the site of fabrication or installation.
- I. Inspection and approval of all completed and assembled work shall take place on the Contractor's premises prior to delivery to the site and installation.
- J. Minor deviations from the specifications will be accepted to utilize a manufacturer's standard product only when, in the judgement of the Commissioner, such deviations do not materially detract from the Design Concept or the intended performance.
- K. The Contractor shall be responsible for the quality of all materials and workmanship required for the execution of this contract, including the materials and workmanship of any firms or individuals who act as his subcontractors. The Contractor shall be responsible for providing subcontractors with complete and up to-date drawings, specifications, graphic schedule and other information issued by the Commissioner.
- L. Written dimensions on the drawings shall have precedence over scaled dimensions. In the event of conflict between written and scale dimensions, or if significant written dimensions are missing, the Contractor shall request such information from the Commissioner.
- M. No fabrication or installation materials or procedures shall be used that will change the visual quality or in any manner have an adverse effect on existing materials and surfaces. All damaged surfaces and materials shall be restored to their original condition and appearance by the Contractor.
- N. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.06 SUBMITTALS

- A. Submit all shop drawings, copies of camera-ready artwork and any other submissions required below to the commissioner for approval prior to fabrication or installation.
- B. Within 10 days of signing the contract submit a detailed schedule for both production and installation of all sign types including dates for submission and approval of all required samples, shop drawings and other submissions required under this contract. If necessary, provide separate information for separate groups of signs.
- C. Submit shop drawings showing proposed details of fabrication and installation of all components. These shall include large-scale details of construction, anchorages and accessory items.
- D. All variations from the contract documents shall be shown on the shop drawings and shall be specifically identified as such by the Contractor. All proposed variations shall equal or surpass the requirements of the originally specified items with regard to appearance, finish, material qualities, size, etc.
- E. Submit full-size xeroxes, blackline prints or photocopies of camera-ready artwork of all graphic components. All full-size layouts and/or camera-ready art will be reviewed by the Commissioner for size, sharpness, alignment, accuracy of letterform, copy composition, and letter, word and line spacing.
- F. In addition to any other submissions required submit one copy only of full size templates of all sign types not to be reproduced photographically, such as individual cut letters, incised signs, neon, hand

painted signs, and three dimensional signs. All such templates must accurately and clearly show, with easily readable lines (pencil outlines are not acceptable unless the body of the character is shaded), all elements and their intended spacing.

- G. Submit two samples of each item before manufacture of any of the final signs of any type. The samples must be installed on site or elsewhere in locations to be specified by the Commissioner. The Commissioner reserves the right to adjust final details, sizes, colors, materials and finishes to be incorporated in the production of the final signs. After inspection and approval all samples must be delivered to the Commissioner and will become his property. In no event shall any samples, whether approved or not, be permanently installed as part of the finished work.

1.07 OWNERSHIP MATERIALS

- A. All film reproductions prepared by the Contractor for the production of the work in this contract shall be the property of the City of NY, and shall be delivered to the Commissioner upon request.

1.08 GUARANTEE

- A. Provide a one-year guarantee of materials and workmanship for all work. Should defects appear within the warranty period, the City of NY shall have the right to continue use of the defective work until necessary repairs are made or until such time that it is replaced. Replacements must fulfill completion of the outstanding guarantee period. The guarantee period begins at the date that a letter of Substantial Completion is issued.

PART 2. PRODUCTS

2.01 GRAPHIC REQUIREMENTS

- A. Certain of the contract drawings contain non-reproducible quality copies of reproducible art. The Contractor must create and submit for approval reproducible quality art before commencing fabrication. Under no circumstances should non-reproducible copies of anything in the contract documents be used as reproducible art.
- B. The contractor shall be responsible for any and all work and/or charges associated with: translation of digital art from one format or operating system platform to another, for any image manipulation needed in order to translate digital art or templates into a format suitable for interface with the contractor's software or equipment, and for image setting onto film or other media where required.
- C. The Contractor shall be responsible to create, at the Contractor's own cost, any form of artwork as required by the contract.
- D. All type to be set shall be exactly as specified and shall conform to all details of typefaces and suppliers. Substitutions will only be accepted, at the Commissioner's discretion, where they match the specified face exactly in every detail. The Contractor should be aware that in many instances certain versions of typefaces, although similarly named, may not satisfactorily match specified faces and in such instances will not be allowed.

- E. Typesetting shall have proper letter, word and line spacing as specified and characters shall be sharp, accurately aligned on their baseline, and of consistent density.
- F. Installed work shall be accurately reproduced from the approved artwork. Characters with rounded positive or negative corners, nicked, cut or ragged edges, etc. will not be accepted. Align letterforms to maintain a baseline parallel to the overall format, unless otherwise specified. Specified margins shall be accurately maintained.
- G. Copy shown on any drawings is intended as a guideline for layout and type size only. Refer to the schedules for exact wording. Notations contained within parentheses in the message schedule are instructions only and should not be included in the finished copy.
- H. The layout of the copy on the drawings is based on scale calculations within given and estimated areas. Should any conflict arise in the final copy layout, notify the Commissioner before proceeding. In no event shall size, number of lines of copy or specified letter, word and/or linespacing be modified to get copy to fit.
- I. Braille shall be set as Grade 2, unless otherwise specified and shall comply with American with Disabilities Act and Architectural Barriers Act Accessibility Guidelines, July 23, 2004.
- J. Unless otherwise specified, Braille floor numbers on elevator cab plaques shall not be preceded with the number prefix. Room numbers on door plaques shall be preceded with the number prefix. The initial cap prefix shall not be used as part of any room descriptions on plaques (i.e. the copy shall be set as though it is all lower case).
- K. Braille included on any artwork supplied by the architect is to show position and extent only. It is the Contractor's responsibility to modify the Braille, according to the Contractor's manufacturing requirements, to assure that the dot size of the finished work conforms to the ADA Compliance Code, and any other codes which apply.
- L. The manufacturer's name, trade name or trade mark shall not appear on any visible surface of any of the work. If an Underwriter's Laboratory or any other label is required to be affixed to a sign it shall be placed in an inconspicuous location.

2.02 FABRICATION

- A. The Contractor is to furnish at his own cost and expense all of the labor, materials, tools, expendable equipment and transportation services required to perform and complete the work described in the best possible and most expeditious manner according to the Contract Documents.
- B. All fabrication and installation shall be in accordance with the highest standards of the trade. All signs and components shall be complete and free from visual, structural and mechanical defects.
- C. The Contractor shall apply for and obtain, at his own expense, all permits necessary to complete the work described in the Contract Documents.
- D. All construction, engineering and anchoring details indicated on the Commissioner's drawings are meant as suggestions for design intent only. The Contractor shall take full responsibility for the correct and safe engineering of all sign types and the way in which they are supported and anchored and shall submit in the shop drawings any alternative details which are necessary to result in a satisfactory and safe final product.

- E. The Contractor shall take full responsibility for the effectiveness of all finishes, mechanical systems such as access doors, hinges, etc., and levels of illumination for all internally or integrally illuminated signs and shall submit in the shop drawings any alternative details which are necessary to result in a satisfactory final product. It is the Contractors responsibility to ensure that all such signs function effectively for their intended purpose under all expected environmental conditions. The Contractor shall modify or replace, at his own expense, any signs which do not function satisfactory mechanically, or which do not have effective levels of illumination.
- F. Comply with all current codes and requirements of all relevant regulatory agencies, including American National Standards Institute, Inc., A 117.1-1980 Section 4.30, the Fire Department, and any local or state fireproofing codes. Where so required, tests shall be made and certificates of conformance shall be secured at the expense of the Contractor.
- G. All exterior signage shall be weather tight.
- H. All hardware as noted on drawings shall be furnished and installed. Mechanically fastened plaques, signs and access plates shall incorporate provisions for attachment and removal as required using concealed screws or fasteners wherever possible. Visible fasteners must be vandal-proof and finished to match surrounding surface.

2.03 INSPECTION

- A. During the course of contract the Contractor shall provide access, during normal working hours, to the Architect to inspect all work in progress at the site of fabrication or installation.
- B. Inspection and approval of all completed and assembled work shall take place on the Contractor's premises prior to delivery to the site and installation.

2.04 DELIVERY, STORAGE AND HANDLING

- A. Clearly label the contents of all packages.
- B. Deliver, store and handle all packages so as to protect them from any kind of damage. Inspect all components for evidence of damage at site before installation. Damaged materials shall not be incorporated into the work and shall be removed from the site immediately.
- C. The Contractor shall replace at his own expense all work judged damaged or defective before Substantial Completion.

2.05 FABRICATION, SPECIFIC ITEMS

- A. Adhesive (including tapes)
 - 1. Adhesives required in fabrication and installation shall be compatible with the materials to be laminated or adhered.
 - 2. Adhesives shall be used in accordance with the recommendations of the manufacturer of the adhesives and the material to be laminated or adhered.
 - 3. Surfaces on which adhesives are to be applied shall be smooth, clean and free of dust, dirt, grease, fingerprints or other foreign matter.
 - 4. Adhesives shall be guaranteed not to deteriorate, discolor, delaminate or fail in adhesion for any reason including exposure to heat, sunlight, weathering or other environmental conditions.

5. Adhesives shall not change the color of, or in any way deteriorate, the materials to which they are being applied.
6. Visible joints shall be even and free from air bubbles and other defects.
7. Adhesive Foam Mounting tapes for permanent installation shall be premium quality double coated acrylic foam tape such as manufactured by 3M (VHB Tape) or approved equal. Urethane foam tapes shall not be used.
8. Unless otherwise indicated, when used for permanent installation, adhesive foam mounting tape shall be 1/16" thick and at least 112" wide. Coverage shall be at least one three inch long strip of tape at no less than six inch intervals in any direction. Mounting tape shall not be visible when the sign is viewed in its installed locations under normal conditions. No tape shall be closer than 1/8" to the edge of any component whose controlling dimension is 1" or less, or 1/4" where the dimension is 2" or less, or 112" where the dimension is greater than 2".
9. Silicone adhesives shall be clear, ready-to-use, high performance, premium quality materials, such as manufactured by General Electric (GE 1200), or approved equal.
10. Epoxy adhesives shall be two-component, thermal-setting, premium quality materials such as manufactured by Devcon (Two-Ton Epoxy), or approved equal.

B. Colorfill

1. Colorfill for engraved or etched metal shall consist of premium grade automobile grade lacquer with a semi gloss finish.
2. Colorfill shall have accurate and clean edges, shall accurately follow the contours of the incised pattern or characters, shall be of even and consistent density over all areas required to be colorfilled, without any evidence of changing density or missed areas, and shall not have any overspill onto non-incised areas.

C. Fasteners and Hardware

1. All exposed screws shall be countersunk, unless otherwise noted.

D. Magnesium

1. Magnesium sheet and plate shall be of best architectural quality; stretcher leveled and visually flat.

E. Metal, glass or stone characters, individually water-jet or laser cut

1. Metal, glass, or stone individually cut characters, in either positive or negative form shall be cut from material of the specified material and thickness using abrasive grit water jet or laser. If necessary, all edges shall be sandblasted to remove any cutting marks and shall be smooth, free from any blemishes and shall be square to the face.
2. Where Metal, glass, or stone individually cut characters are to be mounted as extruded" or flush forms in another material, both the positive and negative forms shall be cut from the same electronic template, modified as necessary to ensure a perfect and uniform fit. The positive and negative forms shall be bonded together with epoxy adhesive. There shall be no visible residue of adhesive, or any other form of marring or staining, showing on the exposed surface of the finished work.
3. After cutting, the surfaces of the components shall be finished as specified.
4. If the metal being used is subject to oxidization and is specified as having a polished, satin, or brushed face, the entire character shall receive a protective finish of two thin coats of clear lacquer.

F. Metal Plaque

1. Metal plaques shall be cut from plate of the specified material and thickness. All edges shall be sanded to remove any cutting marks and shall be smooth, free from any saw marks or other blemishes and shall be square to the face.
2. After cutting, the front surfaces and sides shall be finished as specified and the entire plaque shall receive a protective coat of two thin coats of clear lacquer.
3. If the metal being used is subject to oxidization and is specified as having a polished, satin, or brushed face, the entire character shall receive a protective finish of two thin coats of clear lacquer.

G. Paint, ink and varnish

1. All colors shall be exactly reproduced as specified and shall match submitted samples.
2. All paint shall be applied using professional spray equipment in dust-free conditions and shall be allowed to dry or cure properly before being moved.
3. Painted surfaces and other applied finishes shall have a smooth, even finish and be free of imperfections, marks, scratches, embedded dirt, wave patterns or other irregularities.
4. Paint required in fabrication, including paint for lettering, screened copy, subsurface copy, etc. shall be compatible with the materials to which it is applied and shall be guaranteed not to cause discoloration, deterioration or delamination for any reason, including exposure to heat, sunlight, weathering or other environmental conditions.
5. Paints shall be precisely identified on the shop drawings and submitted samples.
6. Prime coats or other surface pre-treatments, where recommended by the manufacturer of the paint, shall be included in the work.

H. Photo-engraving

1. Photo engraving shall use photographic film masters to expose an appropriate acid-resist coating on the surface of metal sheet or plate as specified. The image shall then be evenly etched with acid to the depth specified on the contract drawings. After thorough washing, the engraved letters shall be Colorfilled to the edges of the engraved areas.

I. Pinmounts

1. Pinmounts shall be fabricated from threaded studs permanently fixed to the component to be mounted. All studs shall be square to the face of the component.
2. Pinmounts that are to be exposed to the elements shall be of stainless steel.
3. Epoxied or welded studs shall be fabricated with no distortion or discoloration of the face of the component or any other exposed surfaces.
4. Holes drilled into plastic or wood cut component shall be fabricated with no distortion or other visible effect on face or other exposed surfaces.
5. There shall be sufficient pinmounts to adequately and safely support any component, to ensure that it lays true to the mounting surface, and to prevent it from rotating. There shall be a minimum of four studs on plaques, three studs on individual typographic characters, with the exception of the characters 1 and l which shall have two studs, and a minimum of one stud on punctuation marks.
6. Silicone adhesive shall be used to install pinmounts in walls or other supporting surfaces. Receiving hole shall be of sufficient size to allow positioning, and shall have clean edges and neat appearance.
7. Support components with foam tape or other mechanical means that does not damage surrounding surfaces, until permanent adhesives are set.

- J. Porcelain enamel steel pans
 - 1. Porcelain enamel steel pan signs shall be formed of 14 to 22 gauge steel sheet with 1/8" radius edges and corners. All corners shall be welded. Brazed or soldered corners shall not be used. After forming, all surfaces shall be thoroughly cleaned and etched prior to finishing.
 - 2. At least two coats of porcelain enamel shall be applied to the steel pan. Finishes shall be free of crazing, chips, 'oil-canning', surface blemishes, or other imperfections.
 - 3. Porcelain enamel steel pans which exceed one square foot in area shall have a rigid substrate material in the form of 3/4" exterior grade ply, or 1/4" aluminum plate, bonded to the interior face of the pan with a two-part concrete epoxy or a polyurethane adhesive, to prevent 'oil-canning' or other surface distortion.
- K. Welding
 - 1. Welding shall be accomplished using the highest standards of workmanship. All visible welded connections shall be welded along their entire length and ground flush and smooth without grinding or other finishing marks, heat discoloration or other surface differentiation or variation.

PART 3. EXECUTION

3.01 PRE-INSTALLATION

- A. The location of signs shown on the drawings are for general information only. The fabricator shall arrange a meeting with the Commissioner at the site for final location of signs elements.
- B. The Commissioner shall be notified of any discrepancies in the drawings or graphic schedule, in field dimensions or conditions and/or changes in construction drawings.
- C. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental of timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Locate signage components where indicated on the drawings, in conjunction with field verification by the Commissioner. Installation shall be in compliance with manufacturer's instructions, unless otherwise specified.
- B. Install sign units level, plumb and at a height specified on drawings, unless otherwise indicated.
- C. Install the work in a well-organized and timely manner. Whenever possible, the work shall be installed as one continuous activity. The installation process shall be coordinated to accommodate the needs of the Commissioner.
- D. Inform the Commissioner, at least two weeks in advance, of any intended installation and shall arrange, at the Architect's convenience to have all patterns in place, and initial signs of each type ready for installation and approval by the Commissioner on site before proceeding with the rest of the installation. It is important that such approval processes be organized efficiently so that approvals can take place in a timely manner.

- E. Remove all existing or temporary work at the location of the installation of new signs and repair all surfaces to original condition in the case of new or recently decorated surfaces. Where surfaces are not new or have not been recently decorated (within a period of 12 months) repair and make good all surfaces within an area extending 12" beyond the edge of any newly installed or removed sign or any other area damaged due to the work.
- F. Follow recommendations and instructions for installation as provided by component manufacturers. Notify the Commissioner in writing if such installation will not provide permanent, rigid installation within existing site conditions.
- G. No installation procedures or materials shall be used that will in any way change the visual quality or in any manner have an adverse effect on existing or new materials and surfaces.
- H. Protect all adjacent surfaces from damage during installation. Restore or replace any damaged surfaces to original condition and appearance.
- I. Install all signs at the locations and heights specified in the Contract Documents. All signs shall be installed level and plumb and perpendicular to the surface upon which they are mounted, unless otherwise specified.
- J. Coordinate all scheduling and installation procedures with the Commissioner, General Contractor and others to avoid delays or additional costs.
- K. Where appropriate, coordinate the locations of all work with existing mechanical, electrical and plumbing elements and notify Commissioner in writing of any visual or physical conflicts.
- L. All work shall be provided with suitable protective coverings during shipment and installation. Remove and replace protective coating for inspection when requested. Final removal of protective coatings shall take place only when there is no danger of damage from further work, and all protective coatings shall be removed simultaneously from similarly finished items to prevent uneven oxidation or discoloration.
- M. Remove packing and construction materials from the site. Leave premises broom clean and ready for work under other contracts or ready for use. Vacuum any carpets and spot clean where if necessary.
- N. Exposed surfaces of all work shall be left clean and free of glue, fingerprints, dirt, grease, dust or any other imperfections upon completion of installation.

3.03 GUARANTEE SERVICE

- A. Before Substantial Completion, provide the Commissioner with three copies of clearly written instructions for proper maintenance of all work including electrical systems. Instructions shall address periodic cleaning, service access, painting, color specifications, re-lamping, replacement procedures, etc. Provide detailed troubleshooting and "what to check" lists for all customized electrical or mechanical systems.

3.04 PROJECT CLOSE-OUT

- A. Submit two certified copies of each page of all schedules stating that installation is complete and correct prior to requesting approval of Substantial Completion.

3.05 MESSAGE SCHEDULE

- A. Some of the contract drawings contain non-reproducible quality copies of reproducible art held by the Commissioner. The Contractor must apply to the Commissioner for any reproducible quality art or templates which may exist before commencing fabrication. Under no circumstances should non-reproducible copies of anything in the contract documents be used as reproducible art. The contractor shall create all reproducible artwork and mechanicals necessary to complete the work.
- B. The contractor shall be responsible for any and all work and/or charges associated with: translation of digital art from one format or operating system platform to another, for any image manipulation needed in order to translate digital art or templates into a format suitable for interface with the contractor's software or equipment, and for image setting onto film or other media where required.
- C. Fabricator shall apply to the Commissioner for final message and graphics for all signs before fabrication begins.
- D. Submit two samples of each item before manufacture of any of the final signs of any type. The samples must be installed on site or elsewhere in locations to be specified by the Commissioner. The Commissioner reserves the right to adjust final details, sizes, colors, materials and finishes to be incorporated in the production of the final signs. After inspection and approval all samples must be delivered to the Commissioner and will become his property. In no event shall any samples, whether approved or not, be permanently installed as part of the finished work.

END OF SECTION

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SECTION 10 2113.13 - METAL TOILET COMPARTMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Metal toilet compartments.
- B. Urinal screens.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 10 2800 - Toilet, Bath, and Laundry Accessories.

1.04 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. New York City Environmentally Preferable Purchasing Minimum Standards for Construction, 2012.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall, floor, and ceiling supports, door swings.
- D. Product Data: Provide data on panel construction, hardware, and accessories.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2. PRODUCTS

2.01 MANUFACTURERS

- A. Metal Toilet Compartments:
1. General Partitions Mfg. Corp: www.generalpartitions.com.
 2. Global Steel Products Corp: www.globalpartitions.com.
 3. Metpar Corp: www.metpar.com.
 4. or approved equal.

2.02 MATERIALS

- A. Stainless Steel Sheet: ASTM A666, Type 304.
- B. Recovered Materials Content per NYC EPP, 2012:
1. Steel (BOF)
 - a. Post-Consumer Content: 16%
 - b. Total Recovered Content: 25 - 30%
 2. Steel (EAF)
 - a. Post-Consumer Content: 67%
 - b. Total Recovered Content: 100%

2.03 COMPONENTS

- A. Toilet Compartments: Stainless steel, floor-mounted headrail-braced.
- B. Doors, Panels, and Pilasters: Sheet steel faces, pressure bonded to sound deadening core, formed and closed edges; corners made with corner clips or mitered, welded, and ground smooth.
1. Panel Faces: 20 gage, 0.0359 inch.
 2. Door Faces: 22 gage, 0.0299 inch.
 3. Pilaster Faces: 20 gage, 0.0359 inch.
 4. Reinforcement: 12 gage, 0.1046 inch.
 5. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.
- C. Door and Panel Dimensions:
1. Thickness: 1 inch.
 2. Door Width: 24 inch.
 3. Door Width for Handicapped Use: 36 inch, out-swinging.
 4. Height: 58 inch.
- D. Pilasters: 1-1/4 inch thick, of sizes required to suit compartment width and spacing.
- E. Urinal Screens: Wall mounted with two panel brackets, and floor-to-ceiling vertical upright consisting of pilaster anchored to floor and ceiling.

2.04 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 3 inch high, concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow chrome-plated steel tube, 1 by 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Brackets: Satin stainless steel.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- E. Hardware: Polished stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Thumb turn or sliding door latch with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 5. Provide door pull for outswinging doors.

2.05 FINISHING

- A. Stainless Steel Compartments: No. 4 finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.

- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2601 - WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Corner guards.

1.03 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Anchors for attachment of work of this section, concealed in wall.
- B. Section 06 1000 - Rough Carpentry Blocking for wall and corner guard anchors.

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- D. Samples: Submit two sections of corner guard, 24 inch long, illustrating component design, configuration, color and finish.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Corner Guards - Surface Mounted: one-piece unit without splices, installed with screws.
 - 1. Material: Type 304 stainless steel, No. 4 finish.
 - 2. Thickness: 18 gage, 0.05 inch.
 - 3. Width of Wings: 1-1/2 inches.

2.02 FABRICATION

- A. Fabricate components with tight joints, corners and seams.
- B. Pre-drill holes for attachment.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

END OF SECTION

SECTION 10 2700 - SLIDE POLE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fireman's Slide Pole.
- B. Rubber Landing Pad.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 05 5000 - Metal Fabrications.
- C. DDC General Conditions

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, plans, elevations, sections and details. Include floor opening dimensions and details.
- D. Manufacturer's Instructions: Include complete assembly and anchorage requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in factory provided protective coverings and packaging.

- B. Protect materials against damage during transit, delivery, storage, and installation at site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. McIntire Brass Works Inc.: www.slidepole.com.
B. Pole Tech: www.poletech.com
C. or approved equal

2.02 SLIDE POLE

- A. 3" Diameter cold drawn polished brass pole.
B. Wall thickness: 5/32"
C. Provide polished cast brass floor and ceiling flanges.

2.03 FLOOR TRIM KIT

- A. Provide a floor trim kit to trim out 36" floor opening at pole hole. Kit to include:
1. Polished cast bronze trim ring for the floor.
2. Stainless steel opening trim sheet.
3. Polished cast bronze trim ring for the ceiling.

2.04 LANDING PAD

- A. Provide Neoprene Rubber landing pad at pole base:
1. Material: Closed cell black neoprene foam rubber, ASTM-D1056-85, Grade 2C2-E1
2. Thickness: 3"
3. Center Hole: 3" diameter

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
B. Verify field dimensions of locations and areas to receive work.
C. Notify Commissioner immediately of conditions that would prevent satisfactory installation.
D. Do not proceed with work until detrimental conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.

3.03 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION

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SECTION 10 4400 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Fire extinguisher cabinets.

1.03 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.04 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.05 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Shop Drawings: Indicate cabinet physical dimensions.
- D. Product Data: Provide extinguisher operational features.
- E. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.06 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lockers:
 - 1. Art Metal Products: www.artmetalproducts.com.
 - 2. Penco Products, Inc: www.pencoproducts.com.
 - 3. Republic Storage Systems Co: www.republicstorage.com.
 - 4. Corcraft: www.corcraft.org.
 - 5. or approved equal.
- B. Gear Racks:
 - 1. Gear Grid: www.geargridcorp.com
 - 2. or approved equal.
- C. Storage Shelving:
 - 1. Edsal: www.edsal.com
 - 2. Metro Shelving: www.metro.com
 - 3. Uline: www.uline.com
 - 4. or approved equal.

2.02 METAL LOCKERS

- A. Lockers: Single tier ventilated metal lockers, free standing with matching closed base. Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
 - 1. Fittings: Hat shelf, 2 coat hooks.
 - 2. Locking: Padlock hasps, for padlocks provided by Owner.
 - 3. Where ends or sides are exposed, provide flush panel closures.
 - 4. Size as specified in the Furniture Schedule.
 - 5. Color: To be selected by Commissioner; allow for 2 different colors.
- B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
 - 1. Body and Shelves: 24 gage, 0.0239 inch.
 - 2. Base: 20 gage, 0.036 inch.
 - 3. Metal Base Height: 4 inch.
- C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
 - 1. Door Frame: 16 gage, 0.0598 inch, minimum.
- D. Doors: Hollow double pan, sandwich construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
 - 1. Door Outer Face: 18 gage, 0.0478 inch, minimum.
 - 2. Door Inner Face: 20 gage, 0.0359 inch, minimum.
 - 3. Form recess for operating handle and locking device.

4. Provide louvers in door face, top and bottom, for ventilation.
- E. Hinges: Two for doors under 42 inches high; three for doors over 42 inches high; weld securely to locker body and door.
 1. Hinge Thickness: 14 gage, 0.0747 inch.
- F. Sloped Top: 20 gage, 0.0359 inch, with closed ends.
- G. Trim: 20 gage, 0.0359 inch.
- H. Coat Hooks: Stainless steel or zinc-plated steel.
- I. Number Plates: Provide rectangular shaped aluminum plates. Form numbers 1 inch high of block font style with ADA designation, in contrasting color.

2.03 GEAR RACKS

- A. Wall Mounted Turnout Gear Lockers
 1. Size as specified in the Furniture Schedule.
 2. Construction: Units shall be welded at all applicable joints. Forming of metal shall be completed by standard cold-forming operations. Use of fasteners will only be required to allow for knock-down shipping, securing units to mounting surface and on applicable accessories.
 3. Vertical Dividers:
 - a. Outer Frames: 1.25" O.D. x 16 gauge wall thickness ASTM A513 steel tubing.
 - b. Inner Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 4. Back Panel:
 - a. Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 5. Shelves: (1) Top, (1) Bottom. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed. Top shelf includes a 20 gauge steel bracket to accept a 2" x 16" name placard.
 6. Apparel Hooks: (3) per opening. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed.
- B. Mobile Turnout Gear Lockers
 1. Size as specified in the Furniture Schedule.
 2. Construction: Units shall be welded at all applicable joints. Forming of metal shall be completed by standard cold-forming operations. Use of fasteners will only be required to allow for knock-down shipping, securing units to mounting surface and on applicable accessories.
 3. Vertical Dividers:
 - a. Outer Frames: 1.25" O.D. x 16 gauge wall thickness ASTM A513 steel tubing.
 - b. Inner Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 4. Back Panel:
 - a. Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 5. Shelves: (1) Top, (1) Bottom. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed. Top shelf includes a 20 gauge steel bracket to accept a 2" x 16" name placard.
 6. Apparel Hooks: (3) per opening. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed.

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FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

METAL LOCKERS, GEAR RACKS
AND SHELVING
10 5100 - 6

SECTION 10 7500 - FLAGPOLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Stainless steel Flagpoles.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc [Hot-Dip Galvanized] Coatings on Iron and Steel Products; 2013.
- B. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes; 2015.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- D. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2012.
- E. ASTM B580 - Standard Specification for Anodic Oxide Coatings on Aluminum

1.04 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Submit material compliance documentation in accordance with DDC General Conditions and Section 01 81 13, Sustainable Design Requirements.
- C. Product Data: Provide data on pole, accessories, and configurations.
- D. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

1.05 QUALITY ASSURANCE

- A. Engineer Qualifications: Provide flagpole supports under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed New York.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

- D. Set brackets for wall set flagpoles anchored securely into wall construction. Seal watertight.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1 inch.

3.05 ADJUSTING

- A. Adjust operating devices so that halyard and flag function smoothly.

END OF SECTION

SECTION 11 4000 - FOODSERVICE EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Food service equipment.

1.03 RELATED REQUIREMENTS

- A. Section 26 0500: Common Work Results for Electrical.
- B. Section 22 0511 Common Work Results for Plumbing.

1.04 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication & Installation Guidelines; 2001
- C. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Product Data: Provide data on appliances; indicate configuration, sizes, materials, finishes, locations, and utility service connection locations, service characteristics, and wiring diagrams.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Certificates: Certify that products of this section meet or exceed specified requirements.
- E. Operation Data: Provide operating data for the specified equipment.

- F. Service Data: Provide lubrication and periodic service requirement schedules.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in City of New York's name and registered with manufacturer.

1.07 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL (EALUED) as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products clear of floor in a manner to prevent damage.
- B. Coordinate size of access and route to place of installation.

1.09 GENERAL

- A. FDNY uses commercial grade equipment in essentially a residential setting, and is thereby exempt from commercial requirements governing grease interceptors. (See FDNY Design and Construction Standards appendix for Department of Environmental Protection letter dated November 2, 2000).
- B. Unless otherwise noted, provide stainless steel finishes for all kitchen appliances, equipment, work-surfaces, islands, sinks, etc.

1.10 WARRANTY

- A. Provide 2 year manufacturer warranty for replacement or repair of scheduled equipment, refrigerant and compressors, including disconnection and removal of defective unit, and connection of replacement unit.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. All Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Worksurfaces and Sinks:
 - 1. Counters: custom designed, one piece unit including double sinks, 16 gauge with 6" back splash, bottom shelf, minimum two utensil drawers.
 - 2. Island: 16 gauge, bottom shelf, minimum two utensil drawers.
 - 3. Treat underside of counters and island with sound deadening material.
 - 4. Double Sinks: Marlo Manufacturing Co., 20" X 20" X 14" deep, or approved equal.
 - 5. Faucet and heavyduty gooseneck sprayer: Advance, Tabco or approved equal, Model#K-117 ("Add- a-Faucet Spout"), Model# K-116 (Sprayer).
- C. Refrigerator/Freezer:

1. LG Model LTC24380 (WHITE), or approved equal, Refrigerator w/ Top-Freezer, total capacity 24.0cf.
- D. Gas Range:
 1. Vulcan Model #260L or approved equal, commercial grade, six (6) burners 12", open top section; porcelain on steel aeration plates and grates. Griddle/broiler - 24". Two ovens (24.25"x22"x14") porcelain on steel liner and aluminized steel construction, nickel-plated oven racks. Provide one-piece, stainless steel 'backsplash', for full width of exhaust hood from bottom of hood to floor.
- E. Dishwasher
 1. LG Model LDF7774ST/WW/BB (WHITE), or approved equal. White front panel, and white panels where appropriate.
- F. Microwave
 1. LG Model LCRT1513, (WHITE) or approved equal, minimum 1.5 cf.
- G. Ice Maker
 1. ICE-O-MATIC Model ICEU070 or approved equal, under counter, must be able to produce 84 pounds of ice in a 24-hour period and be able to store 24 pounds of ice.
- H. Shelving
 1. 18 gauge chrome plated, wall mounted, open Metro, or approved equal, wire metal shelving, 12" deep, mounted 24" above counter. Similar shelving with stainless steel posts shall be used in pantries and other kitchen storage areas. All shelving to be open, do not use cabinet doors.
- I. Pot racks
 1. Marlo Manufacturing Co., or approved equal, stainless steel.
- J. Installation Accessories: Provide all rough-in hardware, supports and connections, attachment devices, closure trim, and accessories required for complete installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify ventilation outlets, service connections, and supports are correct and in required location.
- B. Verify that electric power is available and of the correct characteristics.

3.02 ELECTRICAL REQUIREMENTS

- A. Per code, appliance branch circuits shall be rated for 20A/125V, two (2) receptacles per circuit. Provide separate circuits for dishwasher, microwave, refrigerator and ice machine. All outlets within 24" of water shall be GFI.

3.03 INSTALLATION

- A. Install items in accordance with manufacturers' instructions.

- D. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- E. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.
- F. Selection Samples: Include fabric samples in full range of available colors and patterns.
- G. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
- I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in City of New York's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum 3 years of documented experience.

1.08 MOCK-UP

- A. Mock-Up: Provide full size mock-up of window shade complete with selected shade fabric including sample of seam when applicable.
 - 1. Obtain Commissioner's approval of light and privacy characteristics of fabric prior to fabrication.
 - 2. Full-sized mock-up may become part of the final installation.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.10 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.11 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Provide manufacturer's warranty from the Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: One year.
 - 2. Fabric: One year.
 - 3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manually Operated Roller Shades:
 - 1. MechoSystems: www.mechoshade.com
 - 2. Draper, Inc: www.draperinc.com.
 - 3. Lutron Electronics Co., Inc: www.lutron.com.
 - 4. or approved equal.
- B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 WINDOW SHADE APPLICATIONS

- A. WT-1: Shades: Privacy shades.
 - 1. Type: Roller shades.
 - 2. Fabric: nylon.
 - 3. Color: As selected by Commissioner from manufacturer's full range of colors.
 - 4. Mounting: Inside (between jambs).
 - 5. Operation: Manual.
- B. WT-2: Shades: Blackout shades.
 - 1. Type: Roller shades.
 - 2. Fabric: nylon.
 - 3. Color: As selected by Commissioner from manufacturer's full range of colors.
 - 4. Mounting: Inside (between jambs).
 - 5. Operation: Manual.

2.03 ROLLER SHADES

- A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories; fully factory-assembled.
 - 1. Drop: Reverse roll.
 - 2. Size: As indicated on drawings.
- B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation; PVC-free; 100 percent recycled.
 - 1. WT-1: Privacy Shades: Soften the light yet still reveal some details to the outside; moderate privacy; Openness Factor approximately equal to 1 percent.
 - 2. WT-2: Blackout Shades: Block virtually all the light; Openness Factor equal to zero (0).
 - 3. Flammability: Pass NFPA 701 large and small tests.
- C. Roller Tube: As required for type of operation, extruded aluminum with end caps.
 - 1. Dimensions: Manufacturer's standard, selected for suitability for installation conditions, span, and weight of shades.
 - 2. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.

- 3. Finish: Clear anodized.
- D. Hembars and Hembar Pockets: Wall thickness designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.
 - 1. Style: Full wrap fabric covered bottom bar, flat profile with closed ends.
- E. Manual Operation: Clutch operated continuous loop; beaded ball chain.

2.04 ACCESSORIES

- A. Fascias: Size as required to conceal shade mounting.
 - 1. Style: As selected by Commissioner from shade manufacturer's full selection.
 - 2. Material and Color: To match shade.
- B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.
- C. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.05 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Fabricate shades to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window sill.
 - 2. Horizontal Dimensions - Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 0.75 inches total.
- C. Dimensional Tolerances: As recommended in writing by manufacturer.
- D. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Commissioner of unsatisfactory preparation before proceeding.
- C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Installation Tolerances:
 - 1. Inside Mounting: Maximum space between shade and jamb when closed of 1/16 inch.
 - 2. Maximum Offset From Level: 1/16 inch.
- C. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.05 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 9333 - MANUFACTURED PLANTERS

PART 1 GENERAL

1.01 RELATED DOCUMENT

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. Section includes:
 - 1. Thermoplastic Planter Liners

1.03 RELATED WORK

- A. Section 32 3300 Landscape Metal Fabrications
- B. Section 32 9113 Planting Soils

1.04 SUBMITTALS

- A. Product Data: Manufacturer's standard catalog cut sheets.
- B. Shop Drawings: Show fabrication and installation details. All dimensions to be verified in field and incorporated into shop drawings prior to submittal. Include plans, elevations, sections, and details of planter fabrications and their connections. Show anchorage and accessory items.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Inspect planter liners at delivery for signs of damage during transit.
- B. Protect planter liners from damage during storage and handling.
- C. Store planter liners indoors, in their original packaging. Do not expose thermoplastic planter liners to temperatures during storage where material will exceed 150° F. Do not store planter liners in stacks more than 5 units high. Do not stand or walk on planter liners.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
- B. Contractor to provide adequate structural support to prevent sagging, bowing, or other deflection for planter liner units.
- C. Protect units from damage by adjacent work.

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SECTION 14 2100 - ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Complete electric traction elevator systems.
 - 1. Passenger type.

1.03 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Includes elevator machine foundation, enclosed hoistway, elevator pit, grouting thresholds, and grouting hoistway entrance frames.
- B. Section 04 2000 - Unit Masonry: Masonry hoistway enclosure; building-in and grouting hoistway door frames.
- C. Section 05 1200 - Structural Steel Framing: Includes divider beams and overhead hoist beams.
- D. Section 05 5000 - Metal Fabrications: Includes elevator pit ladder and sill supports.
- E. Section 07 1113 - Bituminous Damproofing: Waterproofing of elevator pit walls and floor.
- F. Section 21 1313 - Automatic Sprinkler System: Sprinkler heads in hoistway.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2010.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2013.

- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- I. ASME A17.1 - Safety Code for Elevators and Escalators; 2013.
- J. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks; 2012.
- K. ASME QE1-1 - Standard for the Qualification of Elevator Inspectors; 2013.
- L. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.
- M. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.
- N. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2013 [Errata 2014].
- O. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; National Fire Protection Association; 2013.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other installers to provide conduits necessary for installation of wiring including but not limited to:
 - a. To elevator equipment devices remote from elevator machine room or hoistway.
 - b. To remote group automatic panel in lobby from controller cabinet.
 - c. To elevator pit for lighting and sump pump.
 - d. To automatic transfer switch from controller cabinet.
 - e. To fire alarm panel from controller cabinet.
 - 2. Coordinate the work with other installers for equipment provisions necessary for proper elevator operation including but not limited to:
 - a. Automatic transfer switches with auxiliary contacts for emergency power transfer status indication.
 - b. Shunt trip devices for automatic disconnection of elevator power prior to fire suppression system activation; include provisions for shunt trip power monitoring.
- B. Preinstallation Meeting: Convene a meeting one week prior to starting work.
 - 1. Review schedule of installation, installation procedures and conditions, and coordination with related work.
- C. Construction Use of Elevator: Not permitted.

1.06 SUBMITTALS

- A. See DDC General Conditions for submittal procedures.
- B. Product Data: Provide data on the following items.

1. Signal and operating fixtures, operating panels, and indicators.
 2. Car design, dimensions, layout, and components.
 3. Car and hoistway door and frame details.
 4. Electrical characteristics and connection requirements.
- C. Shop Drawings: Provide drawings on the following items.
1. Locations of Elevator Machine Equipment: Driving machines, power units, controllers, governors and other components.
 2. Hoistway Components: Car machine beams, guide rails, buffers, ropes, and other components.
 3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 4. Individual weight of principal components; load reaction at points of support.
 5. Loads on hoisting beams.
 6. Clearances and over-travel of car and counterweight.
 7. Locations in hoistway of traveling cables and connections for car lighting and telephone.
 8. Location and sizes of doors and frames.
 9. Interface with building security system.
 10. Electrical characteristics and connection requirements.
 11. Show arrangement of elevator equipment and allow for clear passage of equipment through access openings.
- D. Samples: Submit samples illustrating car interior finishes and handrail material and finish in the form of physical samples.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in City of New York's name and registered with manufacturer.
- F. Operation and Maintenance Data:
1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
 2. Operation and maintenance manual.
 3. Schematic drawings and wiring diagrams.

1.07 QUALITY ASSURANCE

- A. Maintain one copy of each quality standard document on site.
- B. Engineer Qualifications: Perform engineering under direct supervision of a licensed Professional Structural Engineer experienced in design of this type of work and licensed in New York.
- C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 3 years documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section and properly trained by elevator equipment manufacturer.
- E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- F. Products Requiring Electrical Connection: Listed and classified by testing agency acceptable to the authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.08 WARRANTY

- A. See DDC General Conditions for additional warranty requirements.
- B. Provide 12 month manufacturer warranty for elevator operating equipment and devices from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Electric Traction Elevators - Basis of Design: OTIS Gen2 Gearless MRL.
- B. Electric Traction Elevators - Other Acceptable Manufacturers:
 - 1. Schindler Elevator Corporation; Schindler 5500 Low-Rise MRL: www.us.schindler.com.
 - 2. Kone; Ecospace Low-Rise MRL: www.kone.us.
- C. or approved equal.
- D. Source Limitations: Provide elevator and associated equipment and components produced by the same manufacturer as the other elevator equipment used for this project and obtained from a single supplier.

2.02 ELECTRIC TRACTION ELEVATORS

- A. Electric Traction Passenger Elevator, No. 1:
 - 1. Electric Traction Elevator Equipment:
 - a. AC gearless machine, dual solenoid service and emergency disc brakes, mounted at the top of the hoistway.
 - 2. Drive System:
 - a. Permanent magnet (PM) synchronous alternating current (AC) motors and drives.
 - 3. Operation Control Type:
 - a. Selective Collective Automatic Operation Control.
 - 4. Interior Car Height: 93 inch.
 - 5. Electrical Power: 208 volts; alternating current (AC); three phase; 60 Hz.
 - 6. Rated Net Capacity: 4,000 lbs.
 - 7. Rated Speed: 150 ft per minute.
 - 8. Hoistway Size: 102 inch wide by 83 inch deep.
 - 9. Interior Car Platform Size: 89-9/16 inch wide by 65-9/16 inch deep.
 - 10. Elevator Pit Depth: 48 inch.
 - 11. Travel Distance: As indicated on drawings.
 - 12. Number of Stops: As indicated on drawings.
 - 13. Number of Openings: 1 Front.
 - 14. Traction Machine Location: Top of hoistway shaft.

2.03 COMPONENTS

- A. Elevator Equipment:
 - 1. Motors, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70.
 - 2. Guide Rails, Cables, Counterweights, Sheaves, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code.
 - 3. Buffers:
 - a. Spring type for elevators with speed less than 200 ft per minute.
 - 4. Lubrication Equipment:
 - a. Provide grease fittings for periodic lubrication of bearings.
 - b. Grease Cups: Automatic feed type.
 - c. Lubrication Points: Visible and easily accessible.
- B. Electrical Equipment:
 - 1. Motors: NEMA MG 1.
 - 2. Boxes, Conduit, Wiring, and Devices: As required by NFPA 70.
 - 3. Spare Conductors: Include 10 percent extra conductors and two pairs of shielded audio cables in traveling cables.
 - 4. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.

2.04 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).
- B. Accessibility Requirements: Comply with ADA Standards.
- C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.
- D. Perform welding of steel in accordance with AWS D1.1/D1.1M.
- E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and in compliance with requirements of authorities having jurisdiction.
- F. Perform electrical work in accordance with NFPA 70.
- G. Comply with venting or pressurization of the hoistway design in accordance with HVAC system requirements and the authorities having jurisdiction.
- H. Comply with fire protection sprinkler system of the hoistway design in accordance with NFPA 13 requirements and the authorities having jurisdiction. Refer to Section 21 1313.

2.05 MATERIALS

- A. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.
- B. Steel Sheet: ASTM A1008/A1008M, Designation CS, with matte finish.
- C. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.

- D. Extruded Aluminum: ASTM B221 and ASTM B221M, natural anodized finish unless otherwise indicated.
- E. Powder Coat on Steel: Clean and degrease metal surface; apply one coat of primer; two coats of powder coat.
- F. Finish Paint for Metal Surfaces: Alkyd enamel, semi-gloss, color as selected, complying with VOC limitations of authorities having jurisdiction.

2.06 OPERATION CONTROLS

- A. Elevator Controls: Provide landing operating panels and landing indicator panels.
 - 1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
 - 2. Landing Indicator Panels: Illuminating.
 - 3. Comply with ADA Standards for elevator controls.
- B. Interconnect elevator control system with building security, fire alarm, card access, smoke alarm, and building management control systems.
- C. Door Operation Controls:
 - 1. Program door control to open doors automatically when car arrives at floor landing.
 - 2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
 - 3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.
- D. Lobby Monitoring Panel:
 - 1. Locate status indicator and control panel for each individual elevator and group of elevators as indicated on drawings.
 - 2. Etch face plate markings in panel, and fill with paint of contrasting color.
 - 3. Include direction indicator displaying landing "Up" and "Down" calls registered at each landing floor.
 - 4. Include position and motion display for direction of travel of each elevator. Display appropriate graphic characters on non-glare screen. Indicate position of cars at rest and in motion.

2.07 OPERATION CONTROL TYPE

- A. Selective Collective Automatic Operation Control: Applies to car in single elevator shaft.
 - 1. Refer to description provided in ASME A17.1.
 - 2. Automatic operation by means of one button in the car for each landing served and by "UP" and "DOWN" buttons at the landings.
 - 3. Stops are registered by momentary actuation of landing car buttons without consideration of the number of buttons actuated or the sequence buttons are actuated, but the stops are made in the order that landings are reached in each direction of travel.
 - 4. All "UP" landing calls are made when car is traveling in the up direction.
 - 5. All "DOWN" landing calls are made when car is traveling in the down direction.
 - 6. The uppermost and lowermost calls are answered as soon as they are reached without consideration of the car travel direction.

2.08 HOISTWAY ENTRANCES

- A. Hoistway Entrances; Each Floor Elevator Landing:
 - 1. Framed Opening Material and Finish: Painted steel.
 - 2. Door Material and Finish: Painted steel.
 - 3. Paint Color: to match surrounding wall finish.
 - 4. Hoistway Fire Rating: 2 Hours.
 - 5. Door Fire Rating: 1-1/2 Hours.
 - 6. Sills: Extruded aluminum.
- B. Thresholds: Configure to align with frame return and coordinate with floor finish.
- C. Gasketing: Provide acoustic type gasketing at hoistway doors and frames to eliminate audible noise due to car activities in the hoistway, and air pressure differential between hoistway and landing floors.

2.09 CAR FINISH MATERIALS

- A. Car Design: Rigidized brushed stainless steel from manufacturer's standard cab interiors.
- B. Car Operating Panel: Provide main; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served, alarm button, and "Door Open/Door Close" buttons.
 - 1. Position alarm button where it is unlikely to be accidentally actuated; not more than 54 inch above car finished floor.
- C. Comply with ADA Standards for operating panel and interior layout of car.
- D. Stainless Steel Hand Rail: Flat bar stock, 3/8 inch deep by 2 inch high, No. 4 Brushed finish.
- E. Rails: Provide 1-1/2 inch clearance space from wall.
- F. Ceiling System: As selected by Architect from manufacturers standard line.
- G. Pad Hooks: Stainless steel type, mounted at 90 inches high.
- H. Protective Pads: Canvas cover, padded with sponge fill material, sewn with piping edges; brass grommets spaced to match pad hook spacing in car, covering side and rear walls and front return, except cut-out for control panel; provide one set.
- I. Certificate Frame and Glazing: Stainless steel frame, clear tempered glass glazing, attached with tamper proof screws.
- J. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting this work.
- B. Verify that hoistway, pit, machine room, and controller closet are ready for work of this section.

- B. Be responsible for establishing grades and elevations, checking of all interferences, and verify all dimensions and locations in the field prior to the start of any work and/or installation of equipment and piping. The Contractor shall, at his expense, perform all minor rerouting of piping around obstructions from new or existing construction whether or not such conditions are indicated on the plans. Minor rerouting of piping is defined as any rerouting which requires less than 10 linear feet of additional piping over and above that shown on the drawings in order to avoid an obstruction. Such rerouting shall be performed with piping of a size equal to that shown on the original routing. Whenever an obstruction requires more than a minor rerouting as defined above, report the condition to the COMMISSIONER prior to the start of pipework on the affected system. Be responsible for neglect of checking all elevations, clearances, dimensions and locations of piping systems prior to the start of work on same.
- C. All trades shall cooperate and confer with each other as to locations of their materials and equipment before erecting work, so as to avoid interference as much as possible, and in such manner that will in no way retard progress of construction. In instances where interferences develop, relocate the work as required by COMMISSIONER, regardless of which work was installed first.
- D. Additional and supplemental drawings may, from time to time, be furnished and the same when made are to constitute a part of the original contract drawings and will not depart materially there from.
- E. The COMMISSIONER specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to and arrangement of these connections.
- F. Special attention is called to the contract drawings and specifications involving general construction, electrical work and details thereon. Bidders are notified to carefully scrutinize these documents for the details affecting the performance of the mechanical trades.
- G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.

1.05 DEFINITIONS

- A. The following definitions of terms and expressions used in this section are in addition to listing given in General Conditions:
 - 1. "Scheduled" shall mean, "as scheduled on contract drawings".
 - 2. "Concealed", where used in connection with insulation and painting of piping, ducts and accessories, shall mean that they are hidden from sight, as in trenches, chases, furred spaces, pipe shafts or hung ceilings.
 - 3. "Exposed", where used in conjunction with insulation and painting of pipe, ducts and accessories, shall mean that they are not "concealed" as defined herein above.
 - 4. "Singular Number": In all cases where a device or part of the equipment or system is herein referred to in the singular number (such as pump), it is intended that such reference shall apply to as many such items as are required to complete the installation.

1.06 SITE INSPECTION

- A. Bidders shall visit the job site and become thoroughly familiar with the conditions under which the work will be performed. The submission of a proposal shall be construed as evidence that the bidder has visited the site and has knowledge of site conditions. Any later claim for extra payment because of difficulties encountered will not be allowed.

1.07 CARE OF WORK AND SAFEGUARDS

- A. Protect the work from damage by any cause until it is completed and accepted by the Owner.
- B. Protect from damage any underground service or structure exposed by the execution of this work.

- C. Any damaged property resulting from work performed either by this subcontractor, his subcontractors, or anyone in his employ shall be repaired and restored to its original state at no cost to the Owner.

1.08 SCHEDULE OF WORK

- A. Schedule all work to conform to the job progress schedule as submitted to and approved by the COMMISSIONER.

1.09 SUBMITTALS

- A. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material, which has not had prior approval, will not be permitted at the job site.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.
- C. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Engineer's office each time a shop drawing, product data and/or samples is submitted for review. This time period must be considered by the subcontractor when scheduling his work.
- D. Submittals for individual systems and equipment assemblies, which consist of more than one item or component, shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
- E. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- F. Submit each section separately and include the following:
 - 1. Information, which conforms to contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Submittals on all pumps shall be complete with performance curves marked with the design points. Additionally, submittals for any pumps that are in series or parallel with other pumps shall include compounded performance curves for analysis by the COMMISSIONER.
 - 3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
- G. Submit samples as directed of items called for in the specifications; samples of the materials, which the manufacturer will actually ship, shall be submitted for approval after award of contract and be properly labeled or identified.
- H. Submit a minimum of three (3) hard copies of all shop drawings and submittals for Engineer's review.

1.10 SHOP DRAWINGS AND COMPOSITE DRAWINGS

- A. Promptly prepare and submit all shop drawings required by the specifications, contract and contract drawings, and also all incidental shop drawings required for the proper performance of the work. The shop drawings shall illustrate fully the requirements of the specifications and the contract drawings, and shall accurately show quantities, kind of materials, methods of assembly and all data required for fabrication, erection and installation. The relationship to adjoining work, whether furnished under other subdivisions of this contract or by other subcontractors, shall be properly shown.
 - 1. The subcontractor shall prepare underground plumbing drawings and demonstrate coordination with all foundation and underground utilities.

- G. The following is a list of all required progress inspections:

PROGRESS INSPECTION ITEM	CODE/SECTION
Fire-Resistive Rated Construction	BC 109.3.1
Underground Inspection	PC 107.1.1.1

- H. Upon completion of all special inspections, testing and building department sign-off, the fire protection subcontractor shall secure all certificates of compliance and transmit same to owner:

1.15 REFERENCE DOCUMENTS AND STANDARDS

- A. Accepted plumbing standards and organization whose abbreviations are used to identify such standards are listed below:

1. A.N.S.I., American National Standards Institute, Inc.
2. C.S., Commercial Standard - National Bureau of Standards.
3. F.S., Federal Specifications.
4. N.S.F., National Sanitation Foundation Testing Laboratory, Inc.
5. N.F.P.A., National Fire Protection Association.
6. U.L., Underwriters Laboratories.
7. F.M., Factory Mutual

1.16 GUARANTEE

- A. In addition to the requirements stated in the specifications, guarantee all equipment, materials and appurtenances installed to be free from all defects. Upon written notice from the Commissioner, promptly correct all defects without additional cost to the Owner. Make good, at no extra cost any defects in materials or workmanship that may appear. The guarantee period shall be from one (1) year after final inspection and acceptance of the project.

PART 2.00 - PRODUCTS

2.01 QUALITY OF MATERIALS AND SUBSTITUTIONS

- A. Where a specific model and manufacturer of equipment is specified, provide what is specified without substitution. Where specified as "or approved equal", the subcontractor may substitute equipment except that the burden is upon the Contractor to prove such quality. If the contractor elects to prove such equality he must request the Owner's and Commissioner's approval in writing to substitute such item for the specified item, stating the cost difference involved with supporting data, and samples, to permit a fair evaluation of the proposed substitution with respect to quality, serviceability, warranty and cost. A submittal for a proposed substitution must include comparative data of all performance criteria contained in the specifications, schedules and drawings and delineate all differences between the proposed substitution and the specified equipment in terms of space requirements, access requirements, supports, piping and ductwork connections, power wiring, controls and all other changes required to be made in other work including cost adjustment to accommodate the substituted equipment. The Commissioner reserves the right to reject a substitute based upon its compatibility with systems and special layouts or for any performance or construction criteria whether or not that criteria was outlined in the specifications and drawings.
- B. Substituted equipment, where permitted, must conform to space requirements including required access space. Any substituted equipment that cannot meet space requirement shall be replaced at the subcontractor's expense. A specific model and manufacturer of equipment may be used as a standard for producing the drawings. Where the subcontractor elects to use equipment specified other than that used as a drawing standard or where the subcontractor elects to use substitutes if approved, equipment other than that specified, any modifications of related systems or other trades (Electrical,

HVAC, Structural, Architectural, etc.) or additional cost that results from this equipment shall be borne by this subcontractor.

2.02 PRODUCT HANDLING

- A. In addition to the requirements of the General Conditions, the subcontractor shall be responsible for the following:
 - 1. Responsibility for care and protection of plumbing work rests with the subcontractor until it has been tested and accepted.
 - 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage for all causes.
 - 3. Coat polished or plated metal part with Petroleum jelly immediately after installation.
 - 4. Protect equipment outlets and pipe, openings with caps.
- B. Receive, properly house, handle, hoist, deliver to proper location, equipment and other material required for the contract.
- C. Cleanliness of Piping and Equipment Systems:
 - 1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
 - 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
 - 3. The interior of all tanks shall be cleaned prior to delivery and beneficial use by the Government. All piping shall be tested in accordance with the specifications and the International Plumbing Code (IPC), latest edition. All filters, strainers, fixture faucets shall be flushed of debris prior to final acceptance.
 - 4. Subcontractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

2.03 MATERIALS

- A. Design:
 - 1. Unless otherwise specified, equipment or material of same type or classification, used for the same purpose, shall be products of the same manufacturer. All material shall be new and of the latest design of manufacturer providing equipment or materials.
 - 2. Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, or other applicable technical standards, suitable for maximum working pressure and shall have neat and finished appearance.
 - 3. Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- B. Electrical Characteristics:
 - 1. It shall be the responsibility of this subcontractor to ensure that the voltage and current characteristics of the electrical equipment furnished by him shall be suitable for the electrical services as specified.
- C. Lubricating Devices:
 - 1. Provide oil level gauges, grease cups, grease gun fittings for machinery bearings as recommended by machinery manufacturer; where lubricating means are not easily accessible, extend to accessible, extend to accessible locations. Furnish all grease gun fittings of uniform type.

D. Belt Guards:

1. Provide guards to enclose belts, pulleys, sheaves or belt-driven equipment. Construct of galvanized expanded or perforated sheet steel, or 1" mesh wire screen in angle frame with steel angle or channel mounting supports; make guard easily removable for access to belt, pulley or sheave. Conform to codes or regulations of agencies having jurisdiction. Provide access holes for tachometers.

2.04 SLEEVES

- A. Extend through new construction.
 1. For Insulated Piping: Sized to allow for insulation.
- B. No. 22 USSG galvanized iron through:
 1. Interior floor slabs.
 2. Ceilings.
 3. Walls and partitions.
- C. Protect pipes passing through floors with membrane waterproofing and roofs with Schedule 40 pipe extensions (not sheet metal) and provide "Zurn Z-197" or "Josam 1880" with cast iron integral flashing flange and clamping ring waterproof type pipe sleeves. For membraned floors, fill void between sleeve and pipe with mineral wool and then seal the top with mastic to prevent sound transmission. Sleeves for Penetrations of the Metal Deck (where applicable): Nail, Cut or drill the metal deck after the deck is poured. Set sleeves in such a manner so that no concrete fills their interior during the concrete pouring and screening operations.
- D. Sleeves for Reinforced Concrete Walls and in Concrete Beams: Standard weight galvanized steel pipe with anchor flanges. Sleeves through Toilet Rooms and any other such Wet Area Floors: Iron pipe size brass. Caulk floor sleeves for exposed pipes watertight and project approximately 2" above the finished floor so that the plate will properly fit over same. Finish sleeves flush with the bottom of slab and also with the finished faces of wall.
- E. Provide sleeves with an inside diameter at least 1/2" greater than outside of pipe served, including pipe insulation which must be continuous through sleeve.
- F. Do not support pipes by resting clamps on sleeves. Clamps must extend beyond sleeve and be supported outboard of sleeve in an approved manner.

2.05 EXTERIOR WALL/PIPE PENETRATIONS

- A. Underground pipe through wall penetrations shall be sealed with positive hydrostatic seals. The modular mechanical seals shall consist of interlocking rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seals shall be "LINK SEALS" as manufactured by Thunderline Corporation of Wayne, Michigan or an approved equal. Caulking or other type of mastic sealants or lead or oakum joints are not acceptable. The subcontractor shall determine the required inside diameter of each wall opening or sleeve to fit the pipe LINK SEAL. The LINK SEAL size and model shall be as recommended by the manufacturer's instructions.
 1. Seal: Type "C".

2.06 ESCUTCHEONS

- A. Cast iron or cast brass set screw type.
- B. Pressed steel.
- C. For exposed piping through floors or walls.
- D. Finish at exposed walls: Chrome plated.

2.07 NAMEPLATES AND DEVICE PLATE MARKINGS

- A. Install nameplates on all electrical equipment supplied under this trade. This shall include all safety switches, motor starting switches, motor starters, control cabinets, panels, temperature motor control centers, and unit substations designating the equipment served.
- B. Plates shall be laminated plastic 1/2" x 2" or larger in dimension, fastened with counter sunk oval head chrome plated machine screws. Lettering shall be 3/16" high engraved black on white plated.
(Nameplates shall be plastic glued back punched letters as produced by Dymo labeling devices, name plate manufacturers of America, Seton Nameplate Company or approved equal. Letters shall be 1/4" high).
- C. Submit an itemized schedule of proposed markings for approval.

2.08 PIPE SUPPORTS, HANGERS, AND INSERTS

- A. Provide one of the following types of hanger for overhead support of horizontal piping:
1. For copper tubing where hangers are in direct contact with tubing, use clevis type steel hanger, copper plated with supporting rod to suit.
 2. For all piping 2 1/2" and larger: Use clevis type hangers.
 3. Piping 2" and smaller: Swivel ring type.
 4. Provide supporting rods for hangers of diameter as indicated and where not indicated, as specified under "Horizontal Pipe Supports Schedule" hereinafter, of lengths as required, with double locknuts for each.
- B. Where hanger rods leave unsightly holes in ceilings in finished areas, provide steel ceiling plates or cast iron ceiling plates with set screw.
- C. Provide one of the following to support horizontal piping from wall:
1. Where no provision for expansion and contraction is required and pipe can be located close to wall, use steel J-hook, suitable for pipe sizes up to 3".
 2. For hanger suspension, 750 lb. maximum loading, use light welded steel bracket with hole for one rod up to 3/4" diameter. For additional rod suspension, use with this bracket steel clip for pipe sizes up to 3".
- D. Vertical piping supports for copper tubing where hangers are in direct contact with tubing, use copper tubing riser clamps. For steel cast iron pipe use steel extension pipe clamps.
- E. Where beam clamps are required, use malleable iron "C" clamps with case hardened cup pointed set screw and retaining strap or beam clips as required or directed.
- F. Concrete inserts shall be approved for local use and shall be black malleable iron universal type, for threaded connections with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.
- G. All insulated pipe shall be protected at supports by pipe saddles. Pipe saddles for use on hangers shall be Insul-Shield pipe saddles as manufactured by Insul-Cooustic Corp. or approved equal.
- H. Steel anchors of an approved design shall be provided where indicated or required for proper control of stress in piping due to expansion. Anchors shall be made of structural materials of heavy cross section and securely fastened to building construction. Submit detail drawings of approval installation.
- I. Provide pipe alignment guides where indicated, required or directed, to guide the expanding pipe to move freely from anchor points in expansion joints, loops or bends. Construct with angles or channels. Submit detail drawings for approval before installation.
- J. Acceptable Manufacturers
1. Pipe supports shall of the following type and figure number, manufactured by C&P, F&M, Grinnell, or equal as approved:
 2. Pipe Hanger Schedule:

	C&P	F&M	Grinnell
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Beam Clamp	268	282	----
Clevis Hanger	100	239	260
180° Shield	265P	80	----
Pipe Saddle	351	170 & 180 series	1700 series
Rigid Trapeze U-Bolt	371		Std. 45
	382	176	137
Riser Clamp	89 or 126	241	261
Double Bolt Pipe Clamp	304	261	295
Welding Beam Attachment	113B	751	66
Insert	650	----	280
Continuous Slotted Insert	1480	190	----

3. Insulation Protection

For all insulated pipe furnish clevis hangers with welded shields and equal to C&P, Inc., Fig. 100-SH.

K. Pipe Supports in Pipe Chases

Supports shall securely hold piping, prevent vibration, etc. Provide pipe supports and channels as required made grade KJA Cyclocac DH self-extinguishing ABS as manufactured by the Summer Corporation or equal.

2.09 PAINT MATERIALS

A. Factory mixed and delivered to the premises in original sealed containers, with unbroken seals. Containers shall bear the name and trade brand of the manufacturer and must indicate compliance with Federal Specifications, as noted below. Materials shall be approved by the Owner before they are used. Before beginning the painting work submit an affidavit to the Owner stating that all materials proposed comply with this specification.

B. Materials shall comply with the requirements of Federal Specification TT sections as follows:

Aluminum Paint (ready mixed)	P-0038c
Asphaltum Paint	V-51c
Black Paint	P-61d
Colors in Oil	P-381c(2)
Enamel Undercoat	E-543a
Galvanized Iron Primer	P-6411f
Gloss Enamel	E-489f
Iron (Red) Oxide	P-31c
Latex Base Paint	P-29h
Lead, Zinc and Titanium Paint	P-102b
Turpentine	T-801c
Zinc Chromate Primer	P-636b

PART 3.00 - EXECUTION

3.01 SUPERVISION

- A. All work shall be performed by competent mechanics under supervision of an experienced erection supervisor. Upon initiation of construction, keep a suitable force for men (including supervisory personnel) on the site at all times in order to place all sleeves, inserts, and fixtures, and provide all other openings as are required for the satisfactory installation of equipment.

3.02 COORDINATION

- A. Schedule construction and time limitations for each phase of the work. Work shall be coordinated to permit proper setting of the work of other trades.
- B. Where piping work and appurtenances are in place prior to completion of adjacent concrete and masonry work, they must be protected against damage and displacement until construction is completed.

3.03 CUTTING AND PATCHING

- A. Cutting:
1. Provide sleeves for all items furnished and set in new construction. Sleeves in exterior walls or located where moisture must be restricted shall consist of schedule 40 black steel pipe cut to match thickness of wall or floor. 1/4" thick steel plate extending 2" beyond the outside diameter shall be continuously welded midway of the length of the sleeve. Pipe or conduit shall be accurately centered within the sleeve. The remaining annular space shall not be less than 1/2" for pipe up to 3", 3/4" for pipe greater than 3". Impregnated rope shall be packed in, at both ends to a point giving a 2" recess in the annular space. The remaining 2" recess shall be sealed with a resilient, non-hardening sealer, Tremco Mono-Lasto-Meric or approved equal.
 2. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Commissioner where working area space is limited.
 3. Cutting, chasing or core drilling will not be permitted in bearing walls, trusses, girders, or similar structural items unless special permission is obtained from the Commissioner. Be responsible for damages resulting from failure to observe this provision.
 4. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
 5. Where not indicated on drawings or specified as work by other trades, provide all holes, chases and openings in or through construction elements or equipment required for his work. Where such holes, chases and openings are not permitted by the Commissioner, relocate work to clear obstructions as directed. No additional compensation shall be allowed for this work.
- B. Patching:
1. Restore surfaces to original condition with materials coordinated with the contractor
 2. Patching shall be done by men skilled in the trade but paid for by this subcontractor. Finishes shall be restored to match the surrounding or adjacent surfaces perfectly in material, color and texture.
 3. Patch painting shall be done by this subcontractor.

3.04 TEMPORARY OPENINGS

Conform to applicable technical societies' standards, also to codes and regulations of The New York City Building Dept.

2. Locate supports for tanks so as to avoid undue strain on shell and interference with pipe connections to tank outlets.
 3. For tanks containing tubes, check support locations for clearances to pull tubes.
 4. Mount power-driven equipment on common base with driver, unless otherwise indicated, specified or approved.
 5. Submit detailed shop drawings of all supports; obtain approval before fabricating and constructing.
- C. Floor Stands:
1. Unless otherwise indicated, where equipment is indicated or specified to floor mounted on stands or legs, construct of structural steel members or steel pipe and fittings; brace and fasten with flanges bolted to floor.
- D. Suspension Support for Pipes, Equipment:
1. Unless otherwise indicated, all pipes and equipment that are suspended shall be connected directly to the building steel. Where hangers are required between building steel points, supplementary steel members shall be added by the subcontractor as required to adequately support the load.
 2. Pipes shall not be supported from other pipes or equipment.

3.10 SEISMIC DESIGN

- A. The Plumbing subcontractor shall engage the services of a professional engineer with experience in the field of equipment support and seismic restraints (or an approved piping expert who has specialized in piping design). The engineer shall select and coordinate the restraints and supports based on the final coordinated drawings showing exact location of piping and equipment and shall coordinate with the structural engineer to ascertain that the connections to the structure will resist the horizontal forces to which they might be subjected. He shall submit details and calculations as required to demonstrate compliance.
- B. Seismic Restraints as indicated below shall be installed to restrain and protect piping in the event of an earthquake and shall be installed in addition to pipe hangers, brackets and supports. Seismic Restraints shall not be used in lieu of regular hangers and supports as are otherwise required to support the piping.

1. Type LS Seismic Restraints shall be installed for all horizontal and vertical pipe at intervals shown in table below except that all pipe runs 25 ft. or longer shall contain at least one (1) anchor. Where piping contains valves, strainers or other components whose weight is twice greater than an equivalent length of pipe, supplemental Type LS Seismic Restraints shall be installed to restrain the component.

<u>SIZE PIPE</u>	<u>MAXIMUM SPACING OF SEISMIC RESTRAINTS</u>
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Under 2"	20 ft.
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2 1/2" to 12"	25 ft.
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*Pipe anchors are Seismic Restraints

2. Anchors to provide axial restraint shall be installed for all pipe runs over 100 ft. or where weight of a straight section of pipe including pipe, fittings, valves, contents and insulation exceeds a weight in pounds of 500 x nominal pipe diameter (for example, 6000 lb. for 12" pipe, 1500 lb. for 3" pipe). Anchors shall also be installed as described to sectionalize the line to properly accommodate thermal movements, and as required for expansion joints.

3. Where piping is connected to equipment, the piping from equipment nozzle to first Type LS Seismic Restraint shall be designed to accommodate amount of movement permitted by equipment Seismic restraints. If length of piping between equipment nozzle and first Type LS Seismic Restraint exceeds maximum spacing as indicated in paragraph B.1, stress calculations must be performed to assure that pipe stress does not exceed 15000 psi or flexible connectors must be installed to accommodate expected movement.
- C. Type LS Seismic Restraints shall consist of Thunderline Corp. Link-Seal (or approved equal) interlocking synthetic rubber links installed according to manufacturer's instructions in a solid or split pipe sleeve constructed of standard weight pipe or equivalent thickness steel plate rigidly attached to building structure. Style C Link-Seal constructed with EPDM rubber shall be used for all systems operating below 250°F. Where piping is insulated, Link-Seal is to be installed directly on the carrier pipe with the insulation installed to abut the links. Where vapor barriers must be retained, the vapor barrier material should be secured to sleeve or in the case of split sleeves, extend over the sleeve.
- D. The attachment to structure must be designed to accommodate the forces and moments acting in all directions at pipe centerline using an allowable stress of steel components of 1/5 minimum tensile strength or 9500 psi for carbon steel of unknown origin and calculated as follows, but with a minimum force in pounds of 300 x nominal pipe diameter.
 1. For straight sections of pipe, a force in pounds equal to weight of pipe between Seismic Restraints plus proportional weight of any valves and fittings.
 2. For guides installed immediately after an elbow where there is no anchor on the other leg, a force in pounds equal to the weight of the other leg of pipe for which movement is being restrained.
 3. For trapeze hangers supporting more than one pipe, multiple sleeves may be attached to the base of the trapeze, however, the attachments to structure must be designed for total load imposed by all pipes attached to trapeze.
- E. Attachments to structure shall be designed to accommodate force and moment as indicated and shall consist of individual members such as pipe, channels, angles or I-beams in conjunction with at least two additional vertical struts for each vertical member, one (1) longitudinal and one (1) radial to axis of pipe.
- F. In all cases, attachments to structure shall be approved by the commissioner with drawings submitted for approval. Loads and details of attachment to structure shall be submitted to structural engineer for coordination.
- G. Anchors shall be designed to accommodate forces as indicated plus any forces imposed by expansion joints or pipe bends and lops. Loads and details of attachment to structure shall be submitted to structural engineer for coordination.
- H. All requirements for Seismic Design shall be applicable to standpipe, sprinkler and fuel gas systems only.

3.11 PAINTING AND FINISHING

- A. Paint apparatus, equipment, piping, coverings, hangers, supports, and foundations, except otherwise specified. For performing this work, employ an experienced subcontractor specializing in painting work and approved by the Owner.
- B. Where a priming coat or other painting is specified under other sections of the specification, such coat shall not be considered as one of the coats of paint specified in this section.
- C. Piping and covering concealed in hung ceilings, in furred-out spaces and inaccessible locations are not required to be painted at the site. Piping in trenches and piping laid in the ground shall be painted as specified.
 1. Uninsulated piping, including hangers, installed by this subcontractor throughout the building, shall be cleaned and then given one (1) coat of primer and one (1) coat of enamel, color as required.

accommodate the insulation plus 1 inch in diameter. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.

3.14 ACCESS PANELS

- A. Supply access panels for the installation to the GC for concealed valves, expansion joints, valves, traps, strainers and other parts requiring accessibility for operation and maintenance.
- B. Access panel size shall be as indicated; when not indicated, make 18" x 18" minimum or larger as directed or required.
- C. Frames shall be 16-gauge steel.
- D. Access panels for use on masonry, tile, and drywall shall have frames with flanges to hide rough openings in walls.
- E. When access panels or doors are installed in fire-rated construction they shall be fire rated to match the construction.

3.15 ELECTRICAL WIRING DIAGRAMS

- A. Electrical wiring for safety, interlocks, and controls for motors, motor starters and other electrical apparatus and devices shall be provided by this subcontractor regardless of voltage. Power wiring will be by the Electrical subcontractor will be under another Division.
- B. Prepare and submit for approval terminal point to terminal point completely coordinated and integrated wiring diagrams for all wiring.
- C. Submit specific wiring diagrams for factory-installed equipment wiring.

3.16 EXCAVATION AND BACKFILL

- A. All excavation is unclassified. The subcontractor shall inspect the site and make allowance in his bid for soil to excavate since no compensation will be given where rock is encountered.
- B. The subcontractor, unless otherwise noted on the drawings, shall do all excavations for trenches, foundations, and pits of whatever kind necessary for the installation of this work. Bottom of trenches shall have the proper uniform grade wherever possible, or unless otherwise directed.
- C. Trenches are to be excavated to the widths, lines and grades indicated on the drawings and/or specified in the appropriate sections of these specifications. Trenches for piping are to be excavated to a minimum width of one foot (1') plus the outside diameter of the pipe. The trench shall be excavated in a manner such that the pipe will be located in the center of the trench with the trench bottom having the proper uniform grade in the direction of flow. Trenches for water services shall be deep enough to provide a minimum of four feet cover.
- D. In earth excavation, trenches shall be carried to invert of pipe. If rock is encountered, carry trench to a point six inches (6") below pipe invert. No pipe shall be bedded directly upon rock but shall be cushioned by a six-inch (6") layer of selected crushed stone or gravel.
- E. Shore, sheet-pile and brace excavations as required to maintain them secure and to adequately protect life and property; remove shoring as the backfilling progresses, but only when banks are safe against caving or collapse.

- F. Water shall be removed from all excavations promptly and continuously throughout the progress of the work. Keep excavations dry at all times until the pipe and/or accessories are installed. Precautions shall be taken to protect uncompleted work from flooding during storms or from other causes. All necessary precautions shall be taken to prevent disturbance of, and to properly drain, the areas upon which concrete is to be placed. Provide, maintain and operate such sumps, pumps, hoses, piping and other related approved means and equipment, as may be necessary to keep the excavation free from water during all stages of the construction operations and course of work. Provide such sumps and pumping as may be also required to prevent the flow of surface waters into excavated areas and into any and all areas where construction or installations are in progress. Pumped or diverted water shall not adversely affect adjacent property or any other work under construction.
- Water levels shall be kept at the lowest point to safely execute and maintain the work during the entire course of the work.
- G. Do not install conduit or manholes in frozen ground. When freezing temperature may be expected, do not excavate to the full depth indicated, unless the conduit and/or manholes can be installed immediately after the excavation has been completed. Protect the bottoms so excavated from frost if installation of pipe and/or manholes is delayed.
- H. All excavations shall be left open until work has been inspected and approved by the Commissioner. Sufficient time shall be allowed after notice is given that work is ready for inspection for making all examination and tests. Under no circumstances shall excavated material be left, even temporarily, where it will interfere with the building or other subcontractor's operations.
- I. Excavations which pass under or within eighteen inches (18") of columns or wall foundations shall be backfilled up to the level of the columns or wall foundations with concrete mixed in proportions to one part cement, three parts sand and five parts coarse aggregate. Excavations shall not undermine foundations at a slope of 1:1 or greater.
- J. All earth backfilling shall be made in layers not to exceed eight inches (8") and each layer shall be thoroughly tamped into place before the next layer is placed. Backfilling shall be clean earth, free of stone, pieces of concrete, rubbish and other foreign materials. Material frozen in lumps or material softer than the adjoining soil shall not be used in backfilling. The subcontractor shall distribute on the premises as directed all earth remaining after the backfilling.
- K. Any necessary blasting shall be performed by experienced and competent personnel in the most careful manner. All local ordinances and laws relating to blasting and storing of explosives must be strictly observed. No explosives shall be stored on the project property. All subcontractors shall be notified prior to any blasting. Explosives used shall be subject to approval of the Commissioner. The blasting shall be properly covered with blasting mats. Any blasting required shall be performed at such times as to meet reasonable request of the Commissioner.
- L. Any rock encountered within five feet (5') of pipes or building walls shall be removed without blasting.
- M. Provide adequate temporary crossovers for pedestrians and vehicular traffic including guardrails, lamps, flags, as directed; remove same when necessary for such protection ceases.
- N. Material shall be clean, selected earth obtained either from required excavation or from other sources. It shall be used to backfill excavations up to the proper rough grade level required by elevations shown on the drawings. Excavated material used for fill shall be clean, free of loam containing no boulders or stone over 4" in diameter, nor debris, vegetable matter, roots, sod, scrap metal or glass, refuse or other undesirable matter.
- O. Provide and place any additional fill material from off the site as may be necessary to produce the rough sub-grades required. Fill obtained from off site shall be of kind and quality as specified herein before for excavated material. Providing off site fill shall include furnishing, transporting, placing, and consolidating.

- P. Backfilling:
1. Backfill trenches only after locations of duct banks and appurtenances have been recorded.
 2. All lumber, rubbish, and braces shall be carefully removed from excavations before backfilling. Backfill all voids where sheet piling, shoring and bracing is removed.
 3. Materials used for backfill shall contain water content proper for compaction. If the materials are dry, add the required amount of water for compaction and thoroughly mix the soils and water. If the materials contain excessive moisture, they shall be allowed to dry until the proper moisture content for compaction is present.
 4. For a depth of at least 12 inches above the top of the duct bank, pipe or conduit backfill by hand with earth or granular material. Tamp this backfill thoroughly in layers not exceeding 4 inches in thickness, taking care not to disturb or injure the pipe.
 5. For the remaining trench depth, backfill with material as specified in the preceding Section. Compact thoroughly the backfill here referred to with a heavy rammer or an approved mechanical tamper. Backfilling under pavement and other surfacing shall be compacted solidly with mechanical tampers in layers not more than 6" thick, measured loose and each layer shall be compacted to minimum of 95% of the ASTM D1557 maximum density before the next layer is placed. Backfilled areas in locations to be landscaped or not otherwise specified above shall be compacted to not less than 90% of the referenced density test, or as required, to prevent noticeable shrinkage or settlement.
 6. Puddling with water will not be permitted for backfill. Do not attempt compaction when solid is wet with too much moisture or frost in order to avoid rebound and swelling at a later date.

3.17 INTERFERENCE WITH THE OWNER'S NORMAL OPERATION

- A. All work shall be performed in such as not to interfere with the normal work operations in adjacent spaces or buildings.
- B. Do not block or restrict the means of egress of adjacent spaces, decrease the fire ratings of walls, partitions, ceilings, doors or combination thereof of adjacent spaces or means of egress, interrupt safety systems or in any way adversely affect the safety of people or materials.
- C. Provide containment measures to prevent dirt, dust or fumes from reaching adjacent work spaces.
- D. All personnel traffic and material delivery shall be routed so as to absolutely minimize travel through adjacent work areas.

END OF SECTION

SECTION 21 1313 - AUTOMATIC SPRINKLER SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum and [5] the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide a Sprinkler System as shown on the drawings and as specified herein.
 - 1. Complete automatic sprinkler system including piping, fittings, valves, and alarms, as indicated on the Drawings and as specified herein.
 - 2. Sprinkler booster pump
 - 3. Fire extinguishers.
- B. General Requirements:
 - 1. All work shall be properly coordinated with the other trades to avoid conflicts. Refer to the architectural drawings for required ceiling elevations and space clearances and details.
 - 2. All necessary cutting and patching in floor slabs, roof slabs, walls and ceiling for the Fire Protection work shall be performed by this contractor. Restore to match existing conditions.
 - 3. Bidders, before submitting proposals, shall visit and carefully examine the area affected by this work to familiarize themselves with the existing conditions and the difficulties that will attend the execution of this work. Submission of a proposal will be construed as evidence that such an examination has been made, and later claims will not be recognized for extra labor, equipment, or materials, required because of difficulties encountered which would have been foreseen had such as examination been made.
 - 4. All materials and workmanship shall be guaranteed for a period of one year from date of final acceptance of this work. Instruct the owner's personnel in the proper operation and serving of the system.
 - 5. Secure all required permits and approvals and transmit same to the Owner. Contractor shall be responsible for all fees.

1.03 RELATED WORK

- A. Common Work Results for Fire Protection -Section 21 0511

1.04 QUALITY ASSURANCE

- A. A.N.S.I. -American National Standards Institute
- B. A.W.W.A. -American Water Works Association
- C. F.S. -Federal Specifications

- D. N.F.P.A. -National Fire Protection Association Chapter 14 and 20
- E. F.M. -Factory Manual
- F. I.R.I. -Industrial Risk Insurers
- G. U.L. -Underwriters Laboratory

1.05 SUBMITTALS

- A. Layout drawings with hydraulically remote areas indicated signed and sealed by a NYS PE.
- B. Pipe and Fittings.
- C. Control valves, check valves.
- D. Sprinkler Specialties.
- E. Siamese and auto ball drips.
- F. Alarm check valves.
- G. Fire extinguishers.
- H. Sprinkler booster pump with controller.
- I. Jockey pump with controller.
- J. Alarm actuating devices.
- K. Automatic sprinklers and accessories.
- L. Hydraulic calculations and demand curves in accordance with NFPA-13 signed and sealed by a NYS PE.
- M. Copy of test reports.
- N. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material, which has not had prior approval, will not be permitted at the job site.
- O. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.
- P. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Engineer's office each time a shop drawing, product data and/or samples is submitted for review. This time period must be considered by the Contractor when scheduling his work.
- Q. Submittals for individual systems and equipment assemblies, which consist of more than one item or component, shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
- R. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- S. Submit each section separately and include the following:
 - 1. Information, which conforms to contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Submittals on all pumps shall be complete with performance curves marked with the design points. Additionally, submittals for any pumps that are in series or parallel with other pumps shall include compounded performance curves for analysis by the Commissioner.

3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
 - T. Submit samples as directed of items called for in the specifications; samples of the materials, which the manufacturer will actually ship, shall be submitted for approval after award of contract and be properly labeled or identified.
 - U. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification of Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.
 - V. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable style or series number.
- 1.06 OCCUPANCY HAZARD
- A. Sprinkler systems shall be based on noted occupancy hazard, unless the requirements of any specific area make mandatory, a more restrictive system.
 1. Light hazard.
 2. Ordinary hazard.
- 1.07 HYDRAULIC CALCULATIONS
- A. Submit for review four (4) sets of hydraulic calculations stamped approved by the insuring agency and authority having jurisdiction to provide a complete system of automatic sprinklers.
 1. Indicate remote areas and hydraulic reference points.
 2. Submit with demand curves.

PART 2.00 - PRODUCTS

- 2.01 MANUFACTURERS
- A. Steel Pipe
 1. U.S. Steel Company.
 2. Youngstown Steel and Tube Co.
 3. Republic Steel Corporation.
 4. Bethlehem Steel Company.
 5. Or approved equal
 - B. Ductile Iron Pipe:
 1. Clow
 2. US Pipe
 3. Or approved equal
 - C. Grooved M.I. Fittings and Couplings for Grooved Pipe
 1. Victaulic Company
 2. Gustin-Bacon Manufacturing Company
 3. Grinnell Corporation
 4. Or approved equal
 - D. Control and Check Valves (Inside):
 1. Milwaukee
 2. Stockham
 3. Victaulic
 4. Walworth

5. Or approved equal
- E. Sprinkler Specialties:
 1. Viking Corp.
 2. Reliable
 3. Or approved equal
- F. Fire Standpipe Specialties
 1. Potter-Roemer
 2. Croker
 3. Or approved equal
- G. Sprinkler Booster Pump/Jockey Pumps
 1. A-C Fire Pumps.
 2. Peerless Pump Co.
 3. Patterson Pump
 4. Aurora Pump Co.
 5. Grundfos
 6. Or approved equal

2.02 PIPING

- A. Inside Building:
 1. UL listed, FM approved.
 2. Schedule 40 steel pipe, ASTM A795 or A53, with standard weight threaded or flanged cast iron, or threaded malleable iron fittings, except as noted.
 - a. 8" and larger: Schedule 30.
 3. Grooved end ASTM A536 ductile iron fittings, full-flow, short radius, Victaulic FireLock, or forged or fabricated from carbon steel pipe conforming to ASTM A53. Bolted clamp type ductile iron couplings with synthetic rubber pressure-responsive sealing gaskets for grooved end pipe 500psi wwp, similar to Victaulic Style 75 may be used.
 - a. Rigid Type: Housings shall be cast with offsetting, angle- pattern bolt pads to provide rigidity and support and hanging in accordance with NFPA 13.
 - 1) 1-1/4"-4", Installation ready designed for direct "stab" installation onto grooved pipe without prior disassembly of the coupling, 300 psi, Victaulic EZ Style 009, Gustin-Bacon, Grinnell or approved equal.
 - 2) 5"-8", standard rigid joint, 300 psi, Victaulic Style 005, , Gustin-Bacon, Grinnell or approved equal.
 - 3) 10"-12", standard rigid joint, 400 psi, Victaulic Style 07, , Gustin-Bacon, Grinnell or approved equal.
 - b. Flexible Type: Flexible type couplings shall be used in seismic areas where required by NFPA 13. Gaskets shall be suitable for intended service. Victaulic Style 75 or 77.
 - c. Flange Adapters: For use with grooved end pipe and fittings, flat face, for direct connection to ANSI Class 125 and Class 150 flanges, Victaulic Style 744, Stockholm, Walworth or approved equal. For direct connection to ANSI Class 300 flanges, Victaulic Style 743.
 - d. Gaskets shall be pressure-responsive, synthetic rubber, listed for use with the housings:

Fire Protection Service	Temperature Range	Gasket Recommendation
Dry Systems	Ambient	FlushSeal, Grade EPDM, Type A
Freezer Applications	-40°F to 0°F	FlushSeal Grade L Silicone
Water/Wet Systems	Ambient	Grade EPDM, Type A

4. In lieu of threaded cast or malleable iron fittings, carbon steel Pressfit products may be used for fire protection service. Products shall be UL listed and FMG approved for fire protection service

to 175 psi, precision cold drawn carbon steel, externally zinc electroplated, with synthetic rubber o-rings (grade to suit the intended service).

- a. Use a Victaulic "PFT" series tool with the proper sizes jaw for pressing.
5. For 2-1/2" and larger piping Schedule 10 steel piping, ASTM A795 or A53 permitted with roll-grooved ends.
6. Expansion fittings:
 - a. Similar to Metroflex "Fireloop."
 - b. Use flexible type grooved joint mechanical couplings equal to Victaulic Style 75 on expansion loops in accordance with the latest Victaulic recommendations for expansion compensation.
- B. Underground:
 1. UL listed.
 2. Ductile iron, AWWA Class 56, ANSI A-21, cement lined, seal coated, mechanical joint ends.
 - a. Bolted joint, stuffing box type, integral bell with flange made up with rubber ring gasket.
 - b. Manufacturers include: Clow, Mueller Stockholm or approved equal.
 - c. Provide flanged connection inside building.
- C. Galvanized pipe for following:
 1. All preaction system / dry sprinkler piping.
 2. Drain and test piping subject to alternate wetting and drying.
 3. Piping inside building between Siamese and check valve.

2.03

CONTROL VALVES

- A. UL listed and FM approved.
- B. 2" and smaller:
 1. Ball type, bronze body, threaded or grooved ends, 175 psi wwp, solid wedge disc, slow close with position indicator, supervised one circuit tamper switch, similar to Milwaukee Valve Co. BB-SCS02 or BB-VSCS02 series "Butterball", Stockham, Victaulic or approved equal.
 2. Ball type, bronze alloy body, grooved or threaded ends, 350 psi wwp, chrome plated brass ball, stainless steel stem, brass die cast gear box with supervisory switches, similar to Victaulic Series 728 FireLock Ball Valve, Stockham, Milwaukee Valve Co or approved equal.
- C. 2-1/2" and larger:
 1. Flanged, IBBM, OS&Y gate type, 175 psi wwp.
 - a. Milwaukee No. 2885-FP, Stockham, Victaulic or approved equal.
 - b. Provide with UL listed 120 volt, closed circuit, supervisory tamper switch.
 2. Grooved, butterfly valve, 300 psi wwp, synthetic rubber coated ductile iron disc.
 - a. Victaulic Series 705W, Milwaukee, Victaulic or approved equal.
 - b. Provide with supervisory switches and weatherproof actuator.
- D. 4" and larger
 1. UL listed, FM approved, butterfly type, 175 psi wwp, iron body, supervised two circuit tamper switch, similar to Victaulic Series 708W, Milwaukee, Victaulic or approved equal..
- E. OS&Y.
 1. UL listed, flanged IBBM, OS&Y gate type, 175 psi wwp; similar to Stockham No.G-634, , Milwaukee, Victaulic or approved equal..
 2. UL listed, FM approved, flanged IBBM, OS&Y gate type, 250 psi wwp; similar to Nibco Valve Co., No. F-607-RW, , Milwaukee, Victaulic or approved equal.. Where required for 250 psig service.

2.04

FLOOR CONTROL VALVE ASSEMBLY

- A. UL/FMG, floor control valve assembly consists of the following:

1. Control/Indicating Valve: Butterfly-type, 300 psi wwp, ductile iron body with grooved ends, integral weatherproof gear operator, and integral indicating device, provided with supervisory tamper switches. Victaulic Series 705W, Milwaukee, Nibco or approved equal.
2. Inspector's Test Valve Assembly: Grooved or threaded, globe type, with bronze body and bonnet, bronze and copper alloy internals with stainless steel spring, dual polycarbonate sight glasses, integral orifice, and malleable iron handwheel. Victaulic Style 720 TestMaster II, Milwaukee, Nibco or approved equal.
3. Water Flow Device: System Sensor Model WFD, vane type water flow detector.
4. Pressure Gauge.
5. Riser Manifold Assembly similar to Victaulic Style 747, Milwaukee, Stockham or approved equal may be used.
6. Provide all necessary elbows, tees and couplings necessary for a complete assembly and as required for assembly to fit in noted locations.

2.05 DRAIN AND TEST VALVES

- A. Two-piece threaded bronze ball type with chrome-plated brass ball, quarter-turn handle, Stockham No. S-214-TT.
- B. Grooved or threaded globe type with bronze body and bonnet, bronze and copper alloy internals with stainless steel spring, dual polycarbonate sight glasses, integral orifice, and malleable iron handwheel. Victaulic Style 720 TestMaster II, Milwaukee, Stockham or approved equal.
- C. Provide at all low points for system drainage and testing.

2.06 CHECK VALVES

- A. Swing type, except as noted:
 1. 2" and smaller: Threaded bronze, 175 psi wwp; Milwaukee No. 509S or approved equal.
 2. 2-1/2" and larger: UL/FMG, grooved ends, single-disc design, spring-assisted, ductile iron body with aluminum bronze or elastomer encapsulated ductile iron disc, stainless steel spring and shaft, synthetic rubber or welded-in nickel seat; 250 psi wwp: Victaulic Series 717/717R, Milwaukee, Stockham or approved equal.
 - a. And larger sizes available with riser check kit.
 - b. Riser check valves shall be permitted in wet systems that have a constant water pressure. Provide water flow devices equal to System Sensor WFD Series and electric alarm valve.
 3. 2- 1/2" and larger: Flanged IBBM:
 - a. 17th Floor and Above: 175 psi wwp; Stockham No. G-939, Victaulic, Milwaukee or approved equal.
 - b. 16th Floor and Below: 250 psi wwp; Stockham No. F-947, Victaulic, Milwaukee or approved equal.
- B. Pump Discharge: Silent, IBBM, double center guided conical spring type. Note: for 250 PSI service indicate class 250.
 1. 4" and larger: Class 125 Clow Silent Check Valve No. 636, Victaulic Series, Milwaukee or approved equal.
 2. 3" and Smaller: Class 125 Clow-Williams Hager Silent Check Valve No. 329, Victaulic, Milwaukee or approved equal.
- C. Air Lines: Threaded bronze, swing type, 175 psi wwp with composition or leather disc, Stockham No. B-320B, Victaulic, Milwaukee or approved equal.

2.07 FIRE DEPARTMENT SIAMESE CONNECTIONS

- A. Freestanding or flush type as noted, finish as specified by Commissioner, lettered "Standpipe and Sprinkler" or "Sprinkler" as required. Provide 3/4" bronze automatic ball drip. Paint plugs yellow. Freestanding: Croker 5423. Flush type: Croker 6030 or 6031, 6040 or 6041.

- B. Inlet size 6" x 3" x 3" or as indicated on drawings. Hoses and threads as required by local Fire Department.
- C. Install ball drip between siamese and check valve, at lower point. Drain ball drip to floor drain.
- D. Sign: Chrome plated brass, mounted on wall at siamese, 2" high lettering etched and painted. Croker 6778. Finish to be as follows and approved by Commissioner:
 - 1. Dark statuary bronze.
 - 2. Satin finish CP.
 - 3. Bronze.
- E. Independent swivel inlets, each with clapper valve.
- F. Cast iron plug painted green or yellow as required, with brass chain.
- G. Flush Wall Type:
 - 1. Cast brass built-in body and wall plate.
 - a. Word "AUTOSPRK" cast in.
 - 2. Croker 6010 series or approved equal.
 - 3. Where indicated, modified to receive sillcock provided under Plumbing Work.
- H. Siamese: Match ones provide for fire standpipe system.
- I. Provide plates of approved design on building wall, indicating area of building sprinklered.
 - 1. Plate: Bronze.
 - 2. Satin finish stainless steel.

2.08 AUTO BALL DRIPS

- A. 3/4" bronze with both ends threaded; similar to Croker 6780 series or approved equal.

2.09 SEALS, SIGNS, TAGS AND CHARTS

- A. Seals: Provide brass crosslink chain, all brass padlock, 2 keys, or copper wire and approved seal, as required by all authorities having jurisdiction for each manually operated shut-off valve required to be sealed in open position.
- B. Signs: Provide identification signs of standard design, fastened securely at designated location, as required by NFPA 14 and all authorities having jurisdiction.
- C. Tags: Provide brass tags 2" in diameter, stamped with designating numbers and secured with 12 gauge copper wire to spindle of all control valves.
- D. Chart: Provide 2 copies of approved Sprinkler System diagram and valve chart, giving designation number, function, location of each valve, and mount in painted, glazed frames and hang where directed.

2.10 TAMPER SWITCHES

- A. UL Listed, FM approved.
 - 1. Potter Electric Signal Co. Type OSYSU-A2 or approved equal.
- B. Switch shall be "SPDT" with two sets of spare contacts.
- C. Wiring for tamper switches shall be provided under another Section.

2.11 WATERFLOW SWITCHES

- A. UL listed, FM approved, Reliable Automatic Sprinkler Company Model "A" or System Sensor WFD paddle type with adjustable pneumatic retard device to prevent false alarms due to water surges.

- B. Switch shall be "SPDT" with two sets of spare contacts.
- C. Wiring: Provided under another Section.

2.12 SPRINKLERS

- A. Underwriters' listed, cast brass, body with hex shaped wrench boss, closed fusible link or frangible bulb wet type with 1/2 inch discharge orifice. "K" factor shall be 5.3 to 5.8 unless otherwise specified or required. Reliable Automatic Sprinkler Co., Inc., Victaulic Company, or as approved.
 - 1. General Hung Ceiling Area: Standard recessed type, chrome plated.
 - a. Reliable Model G with matching escutcheon.
 - b. Victaulic Model V2707 or V2708 with matching escutcheon.
 - 2. Hung Ceiling Areas, where selected by Commissioner, fully recessed, concealed type "dull white" painted over.
 - a. Reliable Model G-1 Concealer.
 - b. Victaulic Model V3801 or V3802.
 - 3. Finished areas without hung ceilings: Standard upright or pendent type chrome plated.
 - a. Reliable Model G.
 - b. Victaulic Model V2703, V2704, V2707, or V2708.
 - 4. Unfinished areas (Mechanical Equipment rooms, etc.): Standard upright or pendent type, rough brass.
 - a. Reliable Model G.
 - b. Victaulic Model V2703, V2704, V2707, or V2708.
 - 5. Sidewall upright or pendent, dry type head where indicated.
 - a. Reliable Model G3, G3A.
 - b. Victaulic Model V3609, V3610, V3605, or V3606.
 - 6. Sidewall - Chrome plated where indicated.
 - a. Reliable Model G-HSW1.
 - b. Victaulic Model V2709 or V2710.
 - 7. Sprinkler heads shall be Underwriters' Approved cast brass closed fusible link or frangible glass bulb type.

2.13 FLEXIBLE DROP SYSTEM

- A. In lieu of rigid pipe offsets or return bends for sprinkler drops, the Victaulic FireLock Flexible Drop system may be used to locate sprinklers as required by final finished ceiling tiles and walls. The drop system shall consist of a braided or corrugated type 304/316 stainless steel hose piece, 1" NPT male threaded adapter for connection to header piping and a 1/2" or 3/4" NPT female adapter for connection to the sprinkler head. Unions shall be provided on either end of the flexible hose for ease of installation. The flexible drop shall attach to the ceiling grid using a one-piece bracket that can be installed without the use of tools and have a 3" minimum bending radius for installation in narrow or confined spaces. The braided drop system is UL listed and FM approved and the corrugated system is UL listed for sprinkler services to 175 psi.

2.14 SPRINKLER CABINET

- A. Enameled steel with approved number of sprinklers of all type and rating installed, two sprinkler wrenches. Install where directed by the Commissioner. Quantity of sprinklers shall be in accordance with NFPA Standards.

2.15 SYSTEM TEST PIPES

- A. Provide 1" inspectors test pipes fitted with a 1" shutoff valve for each valved sprinkler zone.

1. For open drains: 1" blind test connection, Reliable Model A.
 2. Sight glass with 1/2" minimum orifice for closed drain systems.
 - a. Orifice: Sized for minimum flow rate of one sprinkler in respective sprinkler zone.
- B. Pipe to floor drains or service sink. Floor drains and service sinks shall be provided under another Section.
- C. See details on drawings.
- D. In lieu of test pipe assembly, Victaulic Style 720 TestMaster II, Stockham, Milwaukee or approved equal alarm test module may be used for each valved sprinkler zone.

2.16 ALARM CHECK VALVE

- A. UL listed, FM approved.
- B. IBBM, vertical or horizontal mounting. Body: Cast iron with flanged or ductile iron grooved ends conforming to ANSI B16.5. Clapper: Rubber faced.
- C. Pressure rating: 175 psi wwp and factory tested at 350 psi.
- D. Valve shall be rigged with closed drain retard chamber for variable inlet pressure. Victaulic Series 752, Stockham, Milwaukee or approved equal.
- E. Provide with mechanical (Victaulic Series 760, Stockham, Milwaukee or approved equal) and electrical alarm, pressure switch (System Sensor EPS-10.)
- F. Provide with trim including pressure gauges, test valves, drain valves, external piping and necessary appurtenances.
- G. Internal parts shall be replaceable without removing valve from installed position. Shall be permitted in wet systems that have a constant water pressure.
- H. Victaulic Series 751, Stockham, Milwaukee or approved equal.

2.17 MECHANICAL SPRINKLER ALARM

- A. Furnish mechanical sprinkler alarms where indicated on the drawings.
- B. UL listed, FM approved; 10" diameter gong with 3/4" inlet, 1" drain. Cast aluminum painted red and marked.
 1. Reliable model C.
 2. Victaulic Series 760, Stockham, Milwaukee or approved equal.

2.18 FIRE EXTINGUISHERS

- A. Ten (10) pound size, dry chemical type, U.L. rating 4A:60B:C.
- B. Red polyester coated steel cylinder with pressure gauge and hose with nozzle.
- C. Croker 4010.
- D. Fully recessed cabinet where required. 20 gauge box and door, 18 gauge frame, prime finish, glass panel front.
 1. Croker 2616.
- E. Mechanical/Electrical rooms: 15 pounds CO2 type Croker 4415.
- F. Install as required by code or as noted on Commissioner drawings.

2.19 SPRINKLER BOOSTER PUMP

- A. Provide factory-built and factory-tested packaged automatic fire pump assembly as indicated, of sizes, configuration, and capacities as scheduled, and as specified herein. Units shall consist of pump, piping, valves, accessories, interconnecting wiring, motor starter, and fire pump controller.
- B. The fire pump shall be of a capacity as scheduled on the Drawings. The pump shall also deliver not less than 150% of rated capacity at a pressure not less than 65% of rated head. The shutoff pressure should not exceed 120% of the rated pressure.
- C. The pump shall be the type as scheduled and shall meet all requirements of the National Fire Protection Association (NFPA) Pamphlet #20 and shall be listed by Underwriters' Laboratories (UL) and Factory Mutual (FM) approved. The following accessories shall be included with the pump unit:
 - 1. Main relief valve.
 - 2. Suction and discharge gauges.
 - 3. System gauge.
 - 4. Automatic air release valve.
 - 5. Casing relief valve.
 - 6. Test header (meter).
- D. Pump:
 - 1. Centrifugal type.
 - 2. Cast iron, single stage casing with renewable bronze case wearing rings, double suction enclosed bronze impeller and renewable bronze impeller wearing rings.
 - 3. Extra heavy steel shaft with renewable bronze or stainless steel shaft sleeves.
 - 4. Deep stuffing boxes with bronze glands and external water seal.
 - 5. Heavy duty grease lubricated ball bearings.
 - 6. Grease fittings and drain plugs.
 - 7. Spill gland leakage and bed plate drains over floor drain.
- E. The pump shall be driven by an ODP rated motor, with a 1.15 service factor. The pump and motor shall be connected through a flexible coupling, provided with a coupling guard, on a common fabricated steel base. Motor and pump aligned, bolted and doweled in place on heavy extended box type fabricated steel bed plate with drainage lip, by pump manufacturer.
- F. Locked rotor current shall not exceed the values specified in NFPA Pamphlet #20.
- G. The motor control equipment shall be completely assembled, wired and tested at the factory and the assembly specifically approved for the fire pump purposes. The controller shall be enclosed in a NEMA-II drip tight enclosure and labeled "FIRE PUMP CONTROLLER".
 - 1. The panel shall contain contacts for remote indication of pump operating, power available and control voltage available.
 - 2. The control panel shall start the pump automatically at the pressure cut-in point and shall be stopped manually.
 - 3. Terminals to match feeder size as indicated on Electrical plans.
 - 4. Firetrol FTA1930 Digital Solid State Starting Fire Pump Controllers feature soft start, soft stop and system sensing capabilities that not only provide for reduced current starting, but also offer an improved level of hydro mechanical performance. The controller monitors, displays and records fire pump system information. When called to run, the motor will accelerate beginning at 100% of motor FLA up to a maximum of 300% FLA while rated torque is reduced to 15%. When stopping, the motor will decelerate to a preset level and pause, allowing for a restart if required, limiting stress in the piping system. If no additional starting causes are present, the motor will continue to decelerate to a full stop. This controller helps to reduce water hammer in the system.
 - 5. The pump controller shall be interwired with an Automatic Transfer Switch and shall be considered an integral unit. The transfer switch shall be provided by Fire Pump manufacturer.

2.21 FIRE PUMP TESTING EQUIPMENT

- A. 2-1/2" cotton rubber line hose, six 50' lengths. B. Nozzles: 2-1/2" x 15" x 1-1/8" open tapered red enameled galvanized cast iron. Croker 3489.
- B. Hose Saddle Racks: wall hung steel red enameled finish, attached to wall with backing plate, Croker 135. Provide two.
- C. Spanner Wrench: Croker 2205.
- D. Washers: Provide 12.

PART 3.00 - EXECUTION

3.01 GENERAL REQUIREMENTS FOR ALL FIRE PROTECTION EQUIPMENT

- A. Examination
 - 1. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 2. Examine roughing-in for ductwork, piping, and electrical connections to verify actual locations before installation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Installation
 - 1. Secure all equipment to building structure and install equipment in accordance with approved detail drawings, manufacturer's instructions, and all codes and regulations which apply.
 - 2. Install all accessories not factory installed.
 - 3. Install equipment level and plumb unless otherwise noted.
 - 4. Install equipment with required access and clearances. If there are field condition that prevent providing access and clearances notify the Commissioner. If the equipment is installed before rectifying the access and clearance issues the Contractor shall be require to remove and re-install the unit as required and make any associated changes to the associated ductwork, piping, wiring and controls at no cost to the Owner.
 - 5. Where required suspend equipment from structure or mount on concrete base or stand with vibration isolators. Vibration isolators are specified under Section "Vibration Isolation and Seismic Restraints."
 - 6. Install sensors and controls supplied with the equipment.
- C. Connections
 - 1. Piping installation requirements are specified in other sections.
 - 2. Drawings indicate general arrangement of piping, fittings, and specialties. Arrange connections as per approved shop drawings.
 - 3. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
 - 4. Install piping adjacent to equipment to allow service and maintenance.
 - 5. Ground equipment.
 - 6. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
- D. Field Quality Control
 - 1. Testing: Perform the following field quality-control testing and report results in writing:
 - a. After electrical circuitry has been energized, start units to confirm proper motor.
 - b. Test and adjust controls and safeties.
 - 2. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- E. Cleaning
 - 1. After installing units, inspect equipment for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
 - 2. After installing equipment, clean internally according to manufacturer's written instructions.
 - 3. Install new filters in equipment within two weeks after start up.

4. Basket strainers shall be initially cleaned two week after start-up with a second cleaning two weeks after that.
- F. Start Up
 1. Verify that equipment is installed and connected according to approved shop drawings and contract drawing.
 2. Adjust flows and controls.
 3. Test and adjust controls and safeties. replace damaged and malfunctioning controls and equipment.
- G. Factory Start Up Service
 1. Engage a factory-authorized service representative to perform startup service for the following equipment or as specified under Commissioning:
 - a. Sprinkler booster pump and jockey pump
 2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
 3. Complete installation and startup checks according to manufacturer's written instructions.
 4. Prepare a written startup report that records results of tests and inspections.
- H. Demonstration and Instruction
 1. Engage a factory-authorized service representative to demonstrate the equipment's operation and to instruct Owner's maintenance personnel to adjust, operate, and maintain units as specified under Commissioning.

3.02 INSTALLATION REQUIREMENTS

- A. Piping shall be installed to be clear of any and all conduits, lighting fixtures, ductwork and heating piping. Consult with the Contractors of the other trades to facilitate the erection of the System.
- B. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.
- C. In erecting pipe, friction wrenches and vises shall be used exclusively and any pipe cut, dented or otherwise damaged shall be replaced by this Contractor.
- D. Pipe threads shall be made with the best dies and tools available. During threading, the pipes shall be saturated with solvent to assure sharp threads free of burns and notches.
- E. All screwed joints shall be made with the best quality pure lead, carefully placed on threads of pipe and not in fittings.
- F. Piping and fittings shall be so erected that the entire system may be thoroughly drained.
- G. See Architectural, Structural, Mechanical and Electrical Drawings for construction and interference details. Any changes that may be necessary because of physical conditions or compliance with the standards shall be made by this Contractor without additional cost.
- H. Specific references in this Section or on the Drawings to any article, device, product or material, fixtures or equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and standard quality. All the devices shall be of the make and type listed by the Underwriters Laboratories, Inc. No consideration will be granted for any alleged misunderstanding of the materials to be furnished or work to be done due to a lack of information on the drawings or in the Specifications.
- I. After the piping installations have passed a satisfactory hydrostatic test and/or air test all iron and steel parts shall be thoroughly cleaned ready for painting.
- J. All piping shall be accurately cut to measurements established by the Contractor and shall be installed without springing or forcing.

- K. Drips and drains shall be installed at low pressure points and where required and shall discharge to open sight drains or to standard interior floor drains or service sinks.
- L. Direct connection from any drain to any component of the sanitary drainage system shall be prohibited.
- M. Furnish and set sleeves in walls and floors as required. Escutcheons shall be provided at all penetrations through finish/exposed areas.
- N. All pipe openings shall be capped or plugged during construction and all piping shall be flushed out before closing system.
- O. Pipe compound shall be applied to male threads only.
- P. The use of bushings to reduce the size of openings of fittings is prohibited.

3.03 TESTING

- A. Before any paint is applied, the fire standpipe system shall be tested hydrostatically at not less than 200 psi pressure for two (2) hours minimum, and in accordance with all requirements of the authorities having jurisdiction and NFPA latest edition.
- B. Before any paint is applied, the dry standpipe system shall be tested by air pressure to 40 psig for a period of 24 hours. Leakage in excess of 1- 1/2 psig will not be acceptable.

END OF SECTION

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SECTION 22 0511 - COMMON WORK RESULTS FOR PLUMBING

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting and rigging, scaffolding and services necessary to complete the Plumbing Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Excavation and backfill.
 - 2. Shop drawings and samples.
 - 3. Record and as-built drawings.
 - 4. Domestic water and fire protection services.
 - 5. Sanitary drainage and vent systems.
 - 6. Storm water drainage systems.
 - 7. Sump pumps and sewage ejectors.
 - 8. Domestic water systems.
 - 9. Plumbing equipment.
 - 10. Fuel gas systems.
 - 11. Insulation.
 - 12. Plumbing fixtures.
 - 13. Valved water for HVAC equipment.
 - 14. Controls and control wiring regardless of voltage..
 - 15. Testing of systems.

1.03 WORK NOT INCLUDED

- A. Temporary:
 - 1. Water supply for construction.
 - 2. Toilet facilities for construction.
 - 3. Fire protection during construction.
- B. Finished painting.
- C. Toilet accessories except installation as required by authorities having jurisdiction.
- D. Electrical power wiring.

- E. Installing cover frames (not supplied with equipment) for sewage and sump pits.
- F. Drainage piping extended from HVAC equipment.
- G. Installing access doors.

1.04 CONTRACTOR'S RESPONSIBILITY

- A. Contract drawings for plumbing work are diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, piping and approximate sizes and locations of equipment outlets. Plumbing trade shall follow these drawings in layout of their work, consult general construction, structural and electrical and automatic sprinkler drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed. The drawings indicate size, connections points, and routes of piping. It is not intended however, that all offsets, rises, and drops are shown.
- B. Be responsible for establishing grades and elevations, checking of all interferences, and verify all dimensions and locations in the field prior to the start of any work and/or installation of equipment and piping. The Contractor shall, at his expense, perform all minor rerouting of piping around obstructions from new or existing construction whether or not such conditions are indicated on the plans. Minor rerouting of piping is defined as any rerouting which requires less than 10 linear feet of additional piping over and above that shown on the drawings in order to avoid an obstruction. Such rerouting shall be performed with piping of a size equal to that shown on the original routing. Whenever an obstruction requires more than a minor rerouting as defined above, report the condition to the Commissioner prior to the start of pipework on the affected system. Be responsible for neglect of checking all elevations, clearances, dimensions and locations of piping systems prior to the start of work on same.
- C. All trades shall cooperate and confer with each other as to locations of their materials and equipment before erecting work, so as to avoid interference as much as possible, and in such manner that will in no way retard progress of construction. In instances where interferences develop, relocate the work as required by Commissioner, regardless of which work was installed first.
- D. Additional and supplemental drawings may, from time to time, be furnished and the same when made are to constitute a part of the original contract drawings and will not depart materially there from.
- E. The Commissioner specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to and arrangement of these connections.
- F. Special attention is called to the contract drawings and specifications involving general construction, electrical work and details thereon. Bidders are notified to carefully scrutinize these documents for the details affecting the performance of the mechanical trades.
- G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.

1.05 DEFINITIONS

- A. The following definitions of terms and expressions used in this section are in addition to listing given in General Conditions:
 - 1. "Scheduled" shall mean, "as scheduled on contract drawings".

2. "Concealed", where used in connection with insulation and painting of piping, ducts and accessories, shall mean that they are hidden from sight, as in trenches, chases, furred spaces, pipe shafts or hung ceilings.
3. "Exposed", where used in conjunction with insulation and painting of pipe, ducts and accessories, shall mean that they are not "concealed" as defined herein above.
4. "Singular Number": In all cases where a device or part of the equipment or system is herein referred to in the singular number (such as pump), it is intended that such reference shall apply to as many such items as are required to complete the installation.

1.06 SITE INSPECTION

- A. Bidders shall visit the job site and become thoroughly familiar with the conditions under which the work will be performed. The submission of a proposal shall be construed as evidence that the bidder has visited the site and has knowledge of site conditions. Any later claim for extra payment because of difficulties encountered will not be allowed.

1.07 CARE OF WORK AND SAFEGUARDS

- A. Protect the work from damage by any cause until it is completed and accepted by the Owner.
- B. Protect from damage any underground service or structure exposed by the execution of this work.
- C. Any damaged property resulting from work performed either by this Contractor, his subcontractors, or anyone in his employ shall be repaired and restored to its original state at no cost to the Owner.

1.08 SCHEDULE OF WORK

- A. Schedule all work to conform to the job progress schedule as submitted to and approved by the Commissioner.

1.09 SUBMITTALS

- A. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material, which has not had prior approval, will not be permitted at the job site.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.
- C. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Engineer's office each time a shop drawing, product data and/or samples is submitted for review. This time period must be considered by the Contractor when scheduling his work.
- D. Submittals for individual systems and equipment assemblies, which consist of more than one item or component, shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
- E. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- F. Submit each section separately and include the following:

1. Information, which conforms to contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Submittals on all pumps shall be complete with performance curves marked with the design points. Additionally, submittals for any pumps that are in series or parallel with other pumps shall include compounded performance curves for analysis by the Commissioner.
 3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
- G. Submit samples as directed of items called for in the specifications; samples of the materials, which the manufacturer will actually ship, shall be submitted for approval after award of contract and be properly labeled or identified.
- H. Submit a minimum of three (3) hard copies of all shop drawings and submittals for Engineer's review.

1.10 SHOP DRAWINGS AND COMPOSITE DRAWINGS

- A. Promptly prepare and submit all shop drawings required by the specifications, contract and contract drawings, and also all incidental shop drawings required for the proper performance of the work. The shop drawings shall illustrate fully the requirements of the specifications and the contract drawings, and shall accurately show quantities, kind of materials, methods of assembly and all data required for fabrication, erection and installation. The relationship to adjoining work, whether furnished under other subdivisions of this contract or by other subcontractors, shall be properly shown.
1. The Contractor shall prepare underground plumbing drawings and demonstrate coordination with all foundation and underground utilities.
- B. The HVAC Contractor shall be responsible for coordinating the installation work of all the Mechanical subcontractors (HVAC, Plumbing and Electrical Work) by means of composite shop drawings as specified herein.
- C. The composite shop drawings shall be constituted in the following manner: HVAC Contractor shall prepare a set of sepia transparencies drawn to the scale of $3/8" = 1'-0"$, indicating thereon all ductwork, major piping, plus structural and architectural background details. He shall deliver this set of sepias to the Contractor for Plumbing and Sprinkler who will draw his work to scale on the sepias. Then the HVAC Contractor shall deliver this set of sepias to the Contractor for Electrical Work who will superimpose his work on the drawings. The specified order in which the subcontractors impose their work on the sepias. Then the HVAC Contractor shall deliver this set of sepias to the Contractor for Electrical Work who will superimpose his work on the drawings. The specified order in which the subcontractors impose their work on the sepias is not intended to grant priority to any one Contractor in the allocation of space.
- D. At the completion of this phase, hold a coordination meeting with the other subcontractors to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the work. If the subcontractors are unable to reach agreement on a matter of interference among the mechanical trades, the matter shall be submitted to the Commissioner for his binding decision. After the set of sepias has been coordinated and all necessary changes have been made, each Mechanical Contractor shall sign the drawings, attesting to his agreement that all work is clear.

1.11 OPERATION, MAINTENANCE MANUALS AND INSTRUCTIONS

- A. Furnish to the Commissioner six (6) bound and indexed copies of the final approved installation, operations and maintenance manuals.

B. Manual Contents:

1. Comprehensive detailed information on the approved installation, operation and use, troubleshooting, parts list, lubrication and periodic maintenance, together with the source of replacement parts and service for the items of equipment and the systems covered, including electrical equipment, devices and systems.
2. Where items of equipment or system work in conjunction with one another, the interconnections shall be shown on a single sheet, folded out if necessary. A schematic wiring diagram and a description of operation shall be included.
3. Where separate items of equipment specified herein are combined into a single self-contained unit, the drawings and required data shall treat each item of equipment in such self-contained unit as separate items. Referring to such self-contained unit as one item of equipment will not be acceptable.

C. At the completion of the work, instruct the employees who will have charge of the equipment in the care, adjustment and operation of each piece of equipment. Instruction shall be by competent representatives of the manufacturers involved with adequate time allowed for complete coverage of all owning and operating procedures.

D. In addition, leave with such employees printed instructions covering the operation and required maintenance of each particular piece of equipment. Instructions shall be bound and titled and submitted to the Commissioner for approval. Submit six (6) sets:

1.12 CODES AND STANDARDS

- A. Work performed under this Contract shall conform to all applicable laws, ordinances, regulations, codes (state, local and federal), and shall be subject to control of public authorities having jurisdiction.
- B. Wherever requirements of such laws, codes, regulations differ from the drawings or specifications, they shall take precedence over the drawings specifications, and are expressly made part of the Contract, except where the drawings or specifications are more stringent or require better materials, which would also be acceptable to authorities (i.e., the more stringent code shall always apply).
- C. Any portion of work which is not subject to the approval of an authority having jurisdiction shall be provided in accordance with National Fire Protection Association requirements.
- D. Comply with applicable utility company rules and regulations.
- E. Comply with Occupational Safety and Health Act (OSHA) requirements.

1.13 FEES AND PERMITS AND INSPECTIONS

- A. The Contractor shall secure all permits and pay all fees required by local and state governing bodies necessary to complete the construction. Failure to investigate all applicable payments before the bid submission shall not constitute grounds for additional monies from the Owner. The Owner shall be furnished with all certificates of approval.

1.14 INSPECTIONS, PROGRESS INSPECTIONS, SPECIAL INSPECTIONS AND TESTING

- A. The following inspections, tests, progress inspections and special inspections shall be considered part of the contract work.
- B. Upon completion or partial completion of the permitted plumbing work, inspections, progress inspections, special inspections and tests shall be conducted by approved agencies or special

inspectors qualified to conduct such inspections and tests. Inspections and progress inspections shall be performed in compliance with section BC 109 of the New York City Building Code. Special inspections shall be performed in compliance with sections BC 1704 and BC 1707 of the New York City Building Code for all plumbing systems regulated by the New York City Plumbing Code, sections PC 107, PC 312, Chapters 6, 7, 9 and 11, the New York City Fuel Gas Code, Sections FGC 107, and FGC 406. Refer to article 116 of Chapter 1 of Title 28 of the Administrative Code for additional provisions related to inspections.

- C. Special inspections of plumbing systems shall include the following as applicable to the system:
1. Visual certification that required components of such systems are complete in accordance with the manufacturers installation guidelines and the approved construction documents.
 2. Supports, hangers, seismic bracing, and vibration isolation equipment are properly spaced and anchored to supporting structure.
 3. Installation of required signage and safety instructions.
 4. Electrical components are installed and electrical sign-off issued.
 5. Required labeling, operational instructions and safety signage properly posted.
 6. All related special inspections for such systems are complete.
- D. Progress inspections of plumbing systems shall include the following as applicable to the system:
1. Through-penetration fire stopping.
- E. Tests of plumbing systems shall be performed in accordance with the following New York City Building Code and New York City Plumbing Code Sections:

TEST ITEM	CODE/SECTION
Soil Percolation Tests	BC 1704.20.1
Drainage & Vent Water Test	PC 312.2
Drainage & Vent Air Test	PC 312.3
Drainage & Vent Final Test	PC 312.4
Water Supply System Test	PC 312.5
Water Service Pipe	PC 312.5.1
Gravity Sewer Test	PC 312.6
Forced Sewer Test	PC 312.7
Storm Drainage System Test	PC 312.8
Backflow Prevention Assemblies	PC 312.9
Welder's Qualifications	FGC 406.1.1.1
Regulators and Valve Assemblies	FGC 406.1.5
Expansion Joints	FGC 406.3.1
Gas Distribution Piping	FGC 406.4
Gas Leakage Test	FGC406.6

- F. The following is a list of all required special inspections:

SPECIAL INSPECTION ITEM	CODE/SECTION
Site Storm Drainage Disposal & Detention Facilities	BC 1704.20
Firestopping	BC 1704.25
Seismic Isolation Systems	BC 1707.8
Alternative Engineered Design Systems	PC 107.2
Backflow Prevention Assemblies	PC 312.9
Prefabricated Construction Assemblies	FGC 107.1.2

Welding Requirements

FGC 406.1.1.2

- G. The following is a list of all required progress inspections:

<u>PROGRESS INSPECTION ITEM</u>	<u>CODE/SECTION</u>
Fire-Resistive Rated Construction	BC 109.3.1
Underground Inspection	PC 107.1.1.1
Rough-in Inspection	PC 107.1.1.2
Gas Underground Inspection	FGC 107.1.1
Gas Rough-in Inspection	FGC 107.1.2

- H. Upon completion of all special inspections, testing and building department sign-off, the plumbing contractor shall secure all certificates of compliance for the following service equipment and transmit same to owner:
1. Fuel-gas-burning equipment.
 2. Heating systems.
 3. Boilers.

1.15 REFERENCE DOCUMENTS AND STANDARDS

- A. Accepted plumbing standards and organization whose abbreviations are used to identify such standards are listed below:
1. A.G.A., American Gas Association.
 2. A.S.M.E., American Society of Mechanical Engineers.
 3. A.N.S.I., American National Standards Institute, Inc.
 4. A.S.S.E., American Society of Sanitary Engineering.
 5. A.S.T.M., American Society for Testing and Materials.
 6. A.W.W.A., American Water Works Association.
 7. C.I.S.P.I., Cast Iron Soil Pipe Institute.
 8. C.S., Commercial Standard - National Bureau of Standards.
 9. F.S., Federal Specifications.
 10. N.S.F., National Sanitation Foundation Testing Laboratory, Inc.
 11. P.D.I., Plumbing and Drainage Institute.
 12. N.F.P.A., National Fire Protection Association.
 13. U.L., Underwriters Laboratories.
 14. F.M., Factory Mutual

1.16 GUARANTEE

- A. In addition to the requirements stated in the specifications, guarantee all equipment, materials and appurtenances installed to be free from all defects. Upon written notice from the Commissioner, promptly correct all defects without additional cost to the Owner. Make good, at no extra cost any defects in materials or workmanship that may appear. The guarantee period shall be from one (1) year after final inspection and acceptance of the project.

PART 2.00 - PRODUCTS

2.01 QUALITY OF MATERIALS AND SUBSTITUTIONS

- A. Substituted equipment, where permitted, must conform to space requirements including required access space. Any substituted equipment that cannot meet space requirement shall be replaced at the Contractor's expense. A specific model and manufacturer of equipment may be used as a standard for producing the drawings. Where the Contractor elects to use equipment specified other than that used as a drawing standard or where the Contractor elects to use substitutes if approved, equipment other than that specified, any modifications of related systems or other trades (Electrical, HVAC, Structural, Architectural, etc.) or additional cost that results from this equipment shall be borne by this Contractor.

2.02 PRODUCT HANDLING

- A. In addition to the requirements of the General Conditions, the Contractor shall be responsible for the following:
1. Responsibility for care and protection of plumbing work rests with the Contractor until it has been tested and accepted.
 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage for all causes.
 3. Coat polished or plated metal part with Petroleum jelly immediately after installation.
 4. Protect equipment outlets and pipe, openings with caps.
- B. Receive, properly house, handle, hoist, deliver to proper location, equipment and other material required for the contract.
- C. Cleanliness of Piping and Equipment Systems:
1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
 3. The interior of all tanks shall be cleaned prior to delivery and beneficial use by the Government. All piping shall be tested in accordance with the specifications and the International Plumbing Code (IPC), latest edition. All filters, strainers, fixture faucets shall be flushed of debris prior to final acceptance.
 4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

2.03 MATERIALS

- A. Design:
1. Unless otherwise specified, equipment or material of same type or classification, used for the same purpose, shall be products of the same manufacturer. All material shall be new and of the latest design of manufacturer providing equipment or materials.
 2. Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, or other applicable technical standards, suitable for maximum working pressure and shall have neat and finished appearance.
 3. Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- B. Electrical Characteristics:
1. It shall be the responsibility of this Contractor to ensure that the voltage and current characteristics of the electrical equipment furnished by him shall be suitable for the electrical services as specified.

C. Lubricating Devices:

1. Provide oil level gauges, grease cups, grease gun fittings for machinery bearings as recommended by machinery manufacturer; where lubricating means are not easily accessible, extend to accessible, extend to accessible locations. Furnish all grease gun fittings of uniform type.

D. Belt Guards:

1. Provide guards to enclose belts, pulleys, sheaves or belt-driven equipment. Construct of galvanized expanded or perforated sheet steel, or 1" mesh wire screen in angle frame with steel angle or channel mounting supports; make guard easily removable for access to belt, pulley or sheave. Conform to codes or regulations of agencies having jurisdiction. Provide access holes for tachometers.

2.04 SLEEVES

A. Extend through new construction.

1. For Insulated Piping: Sized to allow for insulation.

B. No. 22 USSG galvanized iron through:

1. Interior floor slabs.
2. Ceilings.
3. Walls and partitions.

C. Protect pipes passing through floors with membrane waterproofing and roofs with Schedule 40 pipe extensions (not sheet metal) and provide "Zurn Z-197" or "Josam 1880" with cast iron integral flashing flange and clamping ring waterproof type pipe sleeves. For membraned floors, fill void between sleeve and pipe with mineral wool and then seal the top with mastic to prevent sound transmission. Sleeves for Penetrations of the Metal Deck (where applicable): Nail, Cut or drill the metal deck after the deck is poured. Set sleeves in such a manner so that no concrete fills their interior during the concrete pouring and screening operations.

D. Sleeves for Reinforced Concrete Walls and in Concrete Beams: Standard weight galvanized steel pipe with anchor flanges. Sleeves through Toilet Rooms and any other such Wet Area Floors: Iron pipe size brass. Caulk floor sleeves for exposed pipes watertight and project approximately 2" above the finished floor so that the plate will properly fit over same. Finish sleeves flush with the bottom of slab and also with the finished faces of wall.

E. Provide sleeves with an inside diameter at least 1/2" greater than outside of pipe served, including pipe insulation which must be continuous through sleeve.

F. Do not support pipes by resting clamps on sleeves. Clamps must extend beyond sleeve and be supported outboard of sleeve in an approved manner.

2.05 EXTERIOR WALL/PIPE PENETRATIONS

A. Underground pipe through wall penetrations shall be sealed with positive hydrostatic seals. The modular mechanical seals shall consist of interlocking rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seals shall be "LINK SEALS" as manufactured by Thunderline Corporation of Wayne, Michigan or an approved equal. Caulking or other type of mastic sealants or lead or oakum joints are not acceptable. The Contractor shall determine the required inside diameter of each wall opening or sleeve to fit the pipe LINK SEAL. The LINK SEAL size and model shall be as recommended by the manufacturer's instructions.

1. Seal: Type "C".

2.06 ESCUTCHEONS

- A. Cast iron or cast brass set screw type.
- B. Pressed steel.
- C. For exposed piping through floors or walls.
- D. Finish at exposed walls: Chrome plated.

2.07 NAMEPLATES AND DEVICE PLATE MARKINGS

- A. Install nameplates on all electrical equipment supplied under this trade. This shall include all safety switches, motor starting switches, motor starters, control cabinets, panels, temperature motor control centers, and unit substations designating the equipment served.
- B. Plates shall be laminated plastic 1/2" x 2" or larger in dimension, fastened with counter sunk oval head chrome plated machine screws. Lettering shall be 3/16" high engraved black on white plated. Name plates shall be produced by Dymo labeling devices, name plate manufacturers of America, Seton Nameplate Company or approved equal
- C. Submit an itemized schedule of proposed markings for approval.

2.08 PIPE SUPPORTS, HANGERS, AND INSERTS

- A. Provide one of the following types of hanger for overhead support of horizontal piping:
 - 1. For copper tubing where hangers are in direct contact with tubing, use clevis type steel hanger, copper plated with supporting rod to suit.
 - 2. For all piping 2 1/2" and larger: Use clevis type hangers.
 - 3. Piping 2" and smaller: Swivel ring type.
 - 4. Provide supporting rods for hangers of diameter as indicated and where not indicated, as specified under "Horizontal Pipe Supports Schedule" hereinafter, of lengths as required, with double locknuts for each.
- B. Where hanger rods leave unsightly holes in ceilings in finished areas, provide steel ceiling plates or cast iron ceiling plates with set screw.
- C. Provide one of the following to support horizontal piping from wall:
 - 1. Where no provision for expansion and contraction is required and pipe can be located close to wall, use steel J-hook, suitable for pipe sizes up to 3".
 - 2. For hanger suspension, 750 lb. maximum loading, use light welded steel bracket with hole for one rod up to 3/4" diameter. For additional rod suspension, use with this bracket steel clip for pipe sizes up to 3".
- D. Vertical piping supports for copper tubing where hangers are in direct contact with tubing, use copper tubing riser clamps. For steel cast iron pipe use steel extension pipe clamps.
- E. Where beam clamps are required, use malleable iron "C" clamps with case hardened cup pointed set screw and retaining strap or beam clips as required or directed.
- F. Concrete inserts shall be approved for local use and shall be black malleable iron universal type, for threaded connections with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.
- G. All insulated pipe shall be protected at supports by pipe saddles. Pipe saddles for use on hangers shall be Insul-Shield pipe saddles as manufactured by Insul-Coustic Corp. or approved equal.

- H. Steel anchors of an approved design shall be provided where indicated or required for proper control of stress in piping due to expansion. Anchors shall be made of structural materials of heavy cross section and securely fastened to building construction. Submit detail drawings of approval installation.
- I. Provide pipe alignment guides where indicated, required or directed, to guide the expanding pipe to move freely from anchor points in expansion joints, loops or bends. Construct with angles or channels. Submit detail drawings for approval before installation.
- J. Acceptable Manufacturers
1. Pipe supports shall of the following type and figure number, manufactured by C&P, F&M, Grinnell, or equal as approved:
 2. Pipe Hanger Schedule:

	C&P	F&M	Grinnell
Beam Clamp	268	282	----
Clevis Hanger	100	239	260
180° Shield	265P	80	----
Pipe Saddle	351	170 & 180 series	1700 series
Rigid Trapeze U-Bolt	371 382	176	Std. 45 137
Riser Clamp	89 or 126	241	261
Double Bolt Pipe Clamp	304	261	295
Welding Beam Attachment	113B	751	66
Insert	650	----	280
Continuous Slotted Insert	1480	190	----

3. Insulation Protection

For all insulated pipe furnish clevis hangers with welded shields and equal to C&P, Inc., Fig. 100-SH.

K. Pipe Supports in Pipe Chases

Supports shall securely hold piping, prevent vibration, etc. Provide pipe supports and channels as required made grade KJA Cycolac DH self-extinguishing ABS as manufactured by the Summer Corporation or equal.

2.09 PAINT MATERIALS

- A. Factory mixed and delivered to the premises in original sealed containers, with unbroken seals. Containers shall bear the name and trade brand of the manufacturer and must indicate compliance with Federal Specifications, as noted below. Materials shall be approved by the Owner before they are used. Before beginning the painting work submit an affidavit to the Owner stating that all materials proposed comply with this specification.
- B. Materials shall comply with the requirements of Federal Specification TT sections as follows:

Aluminum Paint (ready mixed)	P-0038c
Asphaltum Paint	V-51c
Black Paint	P-61d
Colors in Oil	P-381c(2)
Enamel Undercoat	E-543a

Galvanized Iron Primer	P-6411f
Gloss Enamel	E-489f
Iron (Red) Oxide	P-31c
Latex Base Paint	P-29h
Lead, Zinc and Titanium Paint	P-102b
Turpentine	T-801c
Zinc Chromate Primer	P-636b

PART 3.00 - EXECUTION

3.01 SUPERVISION

- A. All work shall be performed by competent mechanics under supervision of an experienced erection supervisor. Upon initiation of construction, keep a suitable force for men (including supervisory personnel) on the site at all times in order to place all sleeves, inserts, and fixtures, and provide all other openings as are required for the satisfactory installation of equipment.

3.02 COORDINATION

- A. Schedule construction and time limitations for each phase of the work. Work shall be coordinated to permit proper setting of the work of other trades.
- B. Where piping work and appurtenances are in place prior to completion of adjacent concrete and masonry work, they must be protected against damage and displacement until construction is completed.

3.03 CUTTING AND PATCHING

- A. Cutting:
1. Provide sleeves for all items furnished and set in new construction. Sleeves in exterior walls or located where moisture must be restricted shall consist of schedule 40 black steel pipe cut to match thickness of wall or floor. 1/4" thick steel plate extending 2" beyond the outside diameter shall be continuously welded midway of the length of the sleeve. Pipe or conduit shall be accurately centered within the sleeve. The remaining annular space shall not be less than 1/2" for pipe up to 3", 3/4" for pipe greater than 3". Impregnated rope shall be packed in, at both ends to a point giving a 2" recess in the annular space. The remaining 2" recess shall be sealed with a resilient, non-hardening sealer, Tremco Mono-Lasto-Meric or approved equal.
 2. Cutting, chasing, or core drilling in the existing building shall be done by this Contractor. Where existing foundations or walls below grade are involved, specific instructions shall first be obtained from the Commissioner.
 3. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Commissioner where working area space is limited.
 4. Measure all existing openings such as doorways, shafts, windows, hatchways, etc., through which equipment may have to be transported or moved. Include in bid any and all necessary widening of existing openings, or any other change in the existing structure necessary to place his materials and equipment in the proper position. All such alterations or changes shall be

completely restored to the original condition, including patching, immediately after the necessary is passed.

5. Cutting, chasing or core drilling will not be permitted in bearing walls, trusses, girders, or similar structural items unless special permission is obtained from the Commissioner. Be responsible for damages resulting from failure to observe this provision.
6. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
7. Where not indicated on drawings or specified as work by other trades, provide all holes, chases and openings in or through construction elements or equipment required for his work. Where such holes, chases and openings are not permitted by the Commissioner, relocate work to clear obstructions as directed. No additional compensation shall be allowed for this work.

B. Patching:

1. Restore surfaces to original condition with materials coordinated with the contractor.
2. Patching shall be done by men skilled in the trade but paid for by this Contractor. Finishes shall be restored to match the surrounding or adjacent surfaces perfectly in material, color and texture.
3. Patch painting shall be done by this Contractor.

3.04 TEMPORARY OPENINGS

- A. Temporary openings not indicated on the drawings which may be required for purpose of bringing equipment into building shall be provided as required subject to the approval of the Commissioner. Perform work of providing protecting and maintaining openings and of restoring structure.
- B. Holes provided in general construction work to permit installation of piping for temporary plumbing services shall, after removal of such piping, be patched as specified.

3.05 CLEARANCE FROM ELECTRICAL EQUIPMENT

- A. Piping is prohibited in all electric rooms and closets, telephone rooms and closets, and elevator machine rooms.
- B. Where transformers, switchboards, motor control centers, electric panels, motor starters, and variable speed drives are located in spaces other than those identified above, a minimum of 3 feet clearance to any equipment, ductwork or piping shall be maintained in front of all low voltage equipment (208 volts or less) and 3-1/2 feet in front of all high voltage equipment (460 volts). This work space shall extend from the floor to the height of the equipment, but not less than 6 1/2' above floor. The width of the workspace shall equal the equipment width but not less than 30".
- C. Where transformers, switchboards, motor control centers, electric panels, motor starters, and variable speed drives are located in spaces other than those identified above, no piping shall be permitted up to the slab above the equipment footprint.

3.06 TESTING, ADJUSTING AND BALANCING

- A. Make all required adjustments to Plumbing system devices until all specified performances are met. Before commencement of construction, test existing equipment to establish output, etc. Submit certified reports indicating motor and compressor amperage draw, rpm, discharge pressure, suction pressure and setting of all controllers.

3.07 CLEAN-UP

- A. Be responsible for the general clean-up of all areas affected by the work in the Contract. All rubbish and accumulative material shall be removed from the premises and the premises left "broom clean" upon completion.

3.08 PIPE HANGER AND SUPPORT INSTALLATION REQUIREMENTS

- A. Provide necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner than horizontal adjustment perpendicular due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction.
- B. Where piping is run near the floor and not hung from the ceiling construction but is supported from the floor, such supports shall be of pipe standards with base flange and adjustable top yoke, 101 or equal.
- C. Except where otherwise noted, piping shall be supported from structural steel only. Provide supplementary steel where required.
- D. Hanger Spacing:

1. Horizontal steel piping shall be supported as follows:

PIPE SIZE (Inches)	ROD DIAMETER (Inches)	MAXIMUM SPACING (Feet)
Up to 1	3/8	8
1 1/2 to 2	3/8	10
2 1/2 to 3	1/2	12
4 to 5	5/8	15
6	3/4	17
8 to 12	7/8	20

2. Horizontal copper piping shall be supported as follows:

PIPE SIZE (Inches)	ROD DIAMETER (Inches)	MAXIMUM SPACING (Feet)
Up to 1	3/8	5
1 1/4 to 2	3/8	8
2 1/2	1/2	9
3 to 4	1/2	10

- E. All hub or joint pipe shall be supported within the above recommendations for steel and at each

- F. Plastic piping systems such as (polyvinyl chloride pipe (PVC) and polypropylene piping) shall be supported at intervals recommended by the manufacturer for a 120°F fluid temperature. Other specialty piping systems, such as PVDF tubing for specialty water systems, shall be continuously supported as recommended by the manufacturer.
- G. All pipes shall be supported within one (1) foot of elbows, valves, flanges, or fittings.
- H. All vertical piping shall be supported at 10 feet maximum intervals or designed as necessary to meet MSS guidelines.

3.09 SUPPORTS, HOUSEKEEPING PADS AND STANDS

A. Housekeeping Pads:

- 1. Housekeeping pads will be provided by the GC.
- 2. Provide to the GC dimensions, size of foundation bolts, methods of setting, aligning and anchoring of equipment as recommended by manufacturer of equipment. Make minimum height above finished floor 4" and extend outer edges 2" minimum beyond machinery bed-plate. Submit shop drawings for approval.
- 3. Supply to the GC foundation bolts, sleeves, washers, nuts and templates to locate position of bolts. Make sleeves of steel pipe; finish flush with top of rough concrete. For anchorage, make embedded end of bolts hooked, or threaded with nut and square plate.
- 4. All concrete equipment bases that are installed on vibration isolators, all anchor and thrust blocks and all piping supports in trenches shall be provided under the work of this Section.
- 5. All concrete work shall conform to A.C.I. standards.
- 6. Provide 1" thick grouting between machinery base plate and concrete pad; fill completely the space between them. Clean top of pad; wet before grouting. Do not remove leveling wedges before grout reaches its final set. Fill voids left by removal of wedges with grout to make neat appearance.

B. Where supports, stands and suspended platforms for machinery, tanks or other equipment are indicated or specified in mechanical work sections, perform as follows:

- 1. Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected, and to distribute properly the load and impact over building areas. Conform to applicable technical societies' standards, also to codes and regulations of agencies having jurisdiction.
- 2. Locate supports for tanks so as to avoid undue strain on shell and interference with pipe connections to tank outlets.
- 3. For tanks containing tubes, check support locations for clearances to pull tubes.
- 4. Mount power-driven equipment on common base with driver, unless otherwise indicated, specified or approved.
- 5. Submit detailed shop drawings of all supports; obtain approval before fabricating and constructing.

C. Floor Stands:

- 1. Unless otherwise indicated, where equipment is indicated or specified to floor mounted on stands or legs, construct of structural steel members or steel pipe and fittings; brace and fasten with flanges bolted to floor.

D. Suspension Support for Pipes, Equipment:

- 1. Unless otherwise indicated, all pipes and equipment that are suspended shall be connected directly to the building steel. Where hangers are required between building steel points,

supplementary steel members shall be added by the Contractor as required to adequately support the load.

2. Pipes shall not be supported from other pipes or equipment.

3.10

SEISMIC DESIGN

- A. The Plumbing contractor shall engage the services of a professional engineer with experience in the field of equipment support and seismic restraints (or an approved piping expert who has specialized in piping design). The engineer shall select and coordinate the restraints and supports based on the final coordinated drawings showing exact location of piping and equipment and shall coordinate with the commissioner to ascertain that the connections to the structure will resist the horizontal forces to which they might be subjected. He shall submit details and calculations as required to demonstrate compliance.
- B. Seismic Restraints as indicated below shall be installed to restrain and protect piping in the event of an earthquake and shall be installed in addition to pipe hangers, brackets and supports. Seismic Restraints shall not be used in lieu of regular hangers and supports as are otherwise required to support the piping.

1. Type LS Seismic Restraints shall be installed for all horizontal and vertical pipe at intervals shown in table below except that all pipe runs 25 ft. or longer shall contain at least one (1) anchor. Where piping contains valves, strainers or other components whose weight is twice greater than an equivalent length of pipe, supplemental Type LS Seismic Restraints shall be installed to restrain the component.

SIZE PIPE

MAXIMUM SPACING OF SEISMIC RESTRAINTS

Under 2"	20 ft.
2 1/2" to 12"	25 ft.

*Pipe anchors are Seismic Restraints

2. Anchors to provide axial restraint shall be installed for all pipe runs over 100 ft. or where weight of a straight section of pipe including pipe, fittings, valves, contents and insulation exceeds a weight in pounds of 500 x nominal pipe diameter (for example, 6000 lb. for 12" pipe, 1500 lb. for 3" pipe). Anchors shall also be installed as described to sectionalize the line to properly accommodate thermal movements, and as required for expansion joints.
 3. Where piping is connected to equipment, the piping from equipment nozzle to first Type LS Seismic Restraint shall be designed to accommodate amount of movement permitted by equipment Seismic restraints. If length of piping between equipment nozzle and first Type LS Seismic Restraint exceeds maximum spacing as indicated in paragraph B.1, stress calculations must be performed to assure that pipe stress does not exceed 15000 psi or flexible connectors must be installed to accommodate expected movement.
- C. Type LS Seismic Restraints shall consist of Thunderline Corp. Link-Seal (or approved equal) interlocking synthetic rubber links installed according to manufacturer's instructions in a solid or split pipe sleeve constructed of standard weight pipe or equivalent thickness steel plate rigidly attached to building structure. Style C Link-Seal constructed with EPDM rubber shall be used for all systems operating below 250°F. Where piping is insulated, Link-Seal is to be installed directly on the carrier pipe with the insulation installed to abut the links. Where vapor barriers must be retained, the vapor barrier material should be secured to sleeve or in the case of split sleeves, extend over the sleeve.

- D. The attachment to structure must be designed to accommodate the forces and moments acting in all directions at pipe centerline using an allowable stress of steel components of 1/5 minimum tensile strength or 9500 psi for carbon steel of unknown origin and calculated as follows, but with a minimum force in pounds of 300 x nominal pipe diameter.
 - 1. For straight sections of pipe, a force in pounds equal to weight of pipe between Seismic Restraints plus proportional weight of any valves and fittings.
 - 2. For guides installed immediately after an elbow where there is no anchor on the other leg, a force in pounds equal to the weight of the other leg of pipe for which movement is being restrained.
 - 3. For trapeze hangers supporting more than one pipe, multiple sleeves may be attached to the base of the trapeze, however, the attachments to structure must be designed for total load imposed by all pipes attached to trapeze.
- E. Attachments to structure shall be designed to accommodate force and moment as indicated and shall consist of individual members such as pipe, channels, angles or I-beams in conjunction with at least two additional vertical struts for each vertical member, one (1) longitudinal and one (1) radial to axis of pipe.
- F. In all cases, attachments to structure shall be approved by the Commissioner with drawings submitted for approval. Loads and details of attachment to structure shall be submitted to commissioner for coordination.
- G. Anchors shall be designed to accommodate forces as indicated plus any forces imposed by expansion joints or pipe bends and lops. Loads and details of attachment to structure shall be submitted to commissioner for coordination.
- H. All requirements for Seismic Design shall be applicable to standpipe, sprinkler and fuel gas systems only.

3.11 PAINTING AND FINISHING

- A. Paint apparatus, equipment, piping, coverings, hangers, supports, and foundations, except otherwise specified. For performing this work, employ an experienced subcontractor specializing in painting work and approved by the Owner.
- B. Where a priming coat or other painting is specified under other sections of the specification, such coat shall not be considered as one of the coats of paint specified in this section.
- C. Piping and covering concealed in hung ceilings, in furred-out spaces and inaccessible locations are not required to be painted at the site. However, piping, insulation facing, etc., located in accessible spaces in basement, pipe space, crawl space or cellar shall be painted as specified. Piping in trenches and piping laid in the ground shall also be painted as specified.
 - 1. Except for finish brass piping, chrome plated piping and galvanized pipe which shall not be painted, exposed uninsulated piping, including hangers, installed by this Contractor throughout the building, shall be cleaned and then given one (1) coat of primer and one (1) coat of enamel, color as required.
 - 2. Exposed pneumatic valves and air piping in finished rooms in and above basement or cellar shall be painted. Conduit or troughing enclosing pneumatic tubing shall not be painted.
 - 3. Piping in floor trenches within the building shall be painted after fabrication with one (1) coat of black asphaltum paint.

4. All exterior, underground, natural gas piping and fittings shall be coated with Hill-Hubbell Spec. BAX-1 pipe covering or approved equal. Buried tees or elbows shall be similar to pipe. All underground piping shall be mill-wrapped.

D. Workmanship

1. Paints shall be applied in a careful manner by painters experienced and skilled in their trade. Materials or work to which paint is to be applied, whether in factory, in ship, or at the site, shall be properly prepared to receive the same. The surfaces shall be dry, free from foreign matter, dirt, cement, plaster, grease, oil, loose paint, scale, scratches, finger marks, and pencil marks. The various surfaces shall be sandpapered or rubbed before and between coats as required to produce a satisfactory surface. No paint shall be applied until the preceding coating is thoroughly dry. Paint shall be evenly spread and well brushed out. It shall be so applied as to eliminate drops, runs or sagging of materials. Enamel shall be evenly and smoothly flowed on. Painting at the site shall not be commenced until ordered by the Owner.
2. Drop clothes shall be used to prevent drops of paint and oil from defacing the painted walls, woodwork, floors, stairs, convectors and furniture. Contractor shall be particularly careful not to get paint on nameplates, valve tags, and on other finished surfaces. Paint spots shall be properly removed from floors and finished surfaces.
3. Each separate application or coat of paint or enamel shall be left until it has been inspected and approved by the Owner before another coat is applied. Each coat of paint applied prior to finishing coat shall be of a shade different from preceding coat, as directed, and from final coat.
4. Where the finished surfaces of the building have become discolored, marred, damaged or otherwise destroyed in the performance of this Contract, the same shall be refinished, painted or varnished (as the case may be) in the best manner of such work and in every respect equal to the work previously existing.

- E. Masonry foundations built by this Contractor shall be painted above the floor with two (2) coats of latex paint, color selected by Commissioner.

- F. Pumps, housings, motors, tanks, air compressors, air storage tanks, auxiliary appliances, and exposed metal supports and framework, furnished and installed under this contract shall be given a shop priming coat of rust-inhibiting paint standard with the manufacturer, and after all other work is finished, one (1) coat at the site with lead and oil paint, or color selected. If not factory painted housings made of aluminum or fiberglass shall not be painted. Equipment finish-painted at the factory may not be required to be painted over at the site, provided finish painting is not damaged and is in good condition at completion of project.

3.12 IDENTIFICATIONS

A. Piping System:

1. All piping systems shall be identified by the name of contents and the direction of flow in accordance with ANSI A13.1.
 - a. Comply with the requirements of the New York City Building Code.
2. Name of contents and directional arrows shall be placed near each valve, on both sides of pipes passing through walls, on long pipe runs at 30-foot intervals.
3. Names of contents and directional arrows shall be laminated in plastic and wraparound pipe marker as manufactured by Seton Nameplate Co., or approved equal.

B. Equipment:

1. All items of plumbing equipment shall be identified by approved nameplates by Contractor furnishing equipment.
2. Nameplates shall be securely affixed to each individual piece of equipment and also to controls for that equipment.
3. Nameplates shall be aluminum 2-1/2" x 3/4" with black enamel back-ground etched or engraved natural aluminum lettering. Manufacturer shall be Seton Nameplate Company or approved equal.
4. Equipment shall be identified as to its type and unit number.

C. Valves:

1. Identify valves and other parts of mechanical systems by means of polished and lacquered brass or aluminum tags, minimum 1- 1/2" round or octagonal, with stamped letters and numbers 1/2" high and filled with black paint. Tag must bear name of particular plumbing or sprinkler system involved and identifying number.

D. Charts:

1. Charts of valves including valve identification number, location and purpose shall be furnished in duplicate.
2. Charts of piping system identification shall be furnished in duplicate. Charts shall include the following:
 - a. Service
 - b. Color field
 - c. Legend
 - d. Color of letters
3. One (1) copy of each chart shall be mounted in a wood frame with clear glass front, and secured to wall, as directed.
4. Second chart shall be prepared for use in location as directed, provided with approved transparent plastic enclosure for permanent protection. Two (2) holes shall be furnished at top of plastic enclosure to allow for affixing an 8" length of nickel-plated bead chain. Each hole to be reinforced by a small brass or nickel grommet. Plastic enclosures as furnished by Dymo labeling devices, name plate manufacturers of America, Seton Nameplate Company or approved equal.

3.13 PIPE PENETRATIONS AND FIRE STOPPING

- A. Pipe penetration sleeves shall be installed for all pipe other than rectangular blocked out floor openings for risers in mechanical bays. Install a firestop that provides an effective barrier against the spread of fire, smoke and gases. Fire-stop material shall be packed tight and completely fill clearances between pipe, sleeves, or cores.
- B. Pipe penetration sleeve materials shall comply with all fire stopping requirements for each penetration. Fire-stopping material shall maintain its dimension and integrity while preventing the passage of flame, smoke and gases. Fire-stopping material shall be non-combustible as defined by ASTM E136.
- C. To prevent accidental liquid spills from passing to a lower level, provide the following:
 1. For sleeves: Extend sleeve 1 inch above finished floor and provide sealant for watertight joint.
 2. For blocked out floor openings: Provide 1-1/2 inch angle set in silicone adhesive around opening.

3. For drilled penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- D. Sheet metal sleeves shall be provided for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
- E. Cast iron or zinc coated pipe sleeves shall be provided for pipe passing through exterior walls below grade. The space between the sleeve and pipe shall be made watertight with a modular or link rubber seal. The link seal shall be applied at both ends of the sleeve.
- F. Galvanized steel or an alternate black iron pipe with asphalt coating sleeves shall be for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. A galvanized steel Sleeve shall be provided for pipe passing through floor of mechanical rooms and laundry work rooms above basement. Except in mechanical rooms, sleeves shall be connected with a floor plate.
- G. Brass Pipe Sleeves shall be provided for pipe passing through quarry tile, terrazzo or ceramic tile floors. The sleeve shall be connected with a floor plate.
- H. Sleeve clearance through floors, walls, partitions, and beam flanges shall be 1 inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation plus 1 inch in diameter. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.

3.14 ACCESS PANELS

- A. Supply access panels for the installation to the GC for concealed valves, expansion joints, valves, traps, strainers and other parts requiring accessibility for operation and maintenance.
- B. Access panel size shall be as indicated; when not indicated, make 18" x 18" minimum or larger as directed or required.
- C. Frames shall be 16-gauge steel.
- D. Access panels for use on masonry, tile, and drywall shall have frames with flanges to hide rough openings in walls.
- E. When access panels or doors are installed in fire-rated construction they shall be fire rated to match the construction.

3.15 ELECTRICAL WIRING DIAGRAMS

- A. Electrical wiring for safety, interlocks, and controls for motors, motor starters and other electrical apparatus and devices shall be provided by this Contractor regardless of voltage. Power wiring will be by the Electrical Contractor will be under another Division.
- B. Prepare and submit for approval terminal point to terminal point completely coordinated and integrated wiring diagrams for all wiring.
- C. Submit specific wiring diagrams for factory-installed equipment wiring.

3.16 DEMOLITION, REMOVALS AND ALTERATIONS

- A. All existing equipment, piping, controls, supports, accessories, etc., shall be removed unless otherwise indicated, required for the operation of equipment or systems to remain, or required for continuity of service to areas outside the work scope.

1. If the Contractor is unclear as to what must be removed, he shall notify the Commissioner prior to demolition.
- B. Modify existing equipment and/or systems as required by the drawings or specifications and as may be required when such work is uncovered and found to interfere with the completion of work in this contract or other contract work.
- C. Remove all demolition material from the project site.

3.17 EXCAVATION AND BACKFILL

- A. All excavation is unclassified. The contractor shall inspect the site for soil to excavate since no compensation will be given where rock is encountered.
- B. The contractor, unless otherwise noted on the drawings, shall do all excavations for trenches, foundations, and pits of whatever kind necessary for the installation of this work. Bottom of trenches shall have the proper uniform grade wherever possible, or unless otherwise directed.
- C. Trenches are to be excavated to the widths, lines and grades indicated on the drawings and/or specified in the appropriate sections of these specifications. Trenches for piping are to be excavated to a minimum width of one foot (1') plus the outside diameter of the pipe. The trench shall be excavated in a manner such that the pipe will be located in the center of the trench with the trench bottom having the proper uniform grade in the direction of flow. Trenches for water services shall be deep enough to provide a minimum of four feet cover.
- D. In earth excavation, trenches shall be carried to invert of pipe. If rock is encountered, carry trench to a point six inches (6") below pipe invert. No pipe shall be bedded directly upon rock but shall be cushioned by a six-inch (6") layer of selected crushed stone or gravel.
- E. Shore, sheet-pile and brace excavations as required to maintain them secure and to adequately protect life and property; remove shoring as the backfilling progresses, but only when banks are safe against caving or collapse.
- F. Water shall be removed from all excavations promptly and continuously throughout the progress of the work. Keep excavations dry at all times until the pipe and/or accessories are installed. Precautions shall be taken to protect uncompleted work from flooding during storms or from other causes. All necessary precautions shall be taken to prevent disturbance of, and to properly drain, the areas upon which concrete is to be placed. Provide, maintain and operate such sumps, pumps, hoses, piping and other related approved means and equipment, as may be necessary to keep the excavation free from water during all stages of the construction operations and course of work. Provide such sumps and pumping as may be also required to prevent the flow of surface waters into excavated areas and into any and all areas where construction or installations are in progress. Pumped or diverted water shall not adversely affect adjacent property or any other work under construction.

Water levels shall be kept at the lowest point to safely execute and maintain the work during the entire course of the work.

- G. Do not install conduit or manholes in frozen ground. When freezing temperature may be expected, do not excavate to the full depth indicated, unless the conduit and/or manholes can be installed immediately after the excavation has been completed. Protect the bottoms so excavated from frost if installation of pipe and/or manholes is delayed.
- H. All excavations shall be left open until work has been inspected and approved by the Commissioner. Sufficient time shall be allowed after notice is given that work is ready for inspection for making all

examination and tests. Under no circumstances shall excavated material be left, even temporarily, where it will interfere with the building or other contractor's operations.

- I. Excavations which pass under or within eighteen inches (18") of columns or wall foundations shall be backfilled up to the level of the columns or wall foundations with concrete mixed in proportions to one part cement, three parts sand and five parts coarse aggregate. Excavations shall not undermine foundations at a slope of 1:1 or greater.
- J. All earth backfilling shall be made in layers not to exceed eight inches (8") and each layer shall be thoroughly tamped into place before the next layer is placed. Backfilling shall be clean earth, free of stone, pieces of concrete, rubbish and other foreign materials. Material frozen in lumps or material softer than the adjoining soil shall not be used in backfilling. The contractor shall distribute on the premises as directed all earth remaining after the backfilling.
- K. Any necessary blasting shall be performed by experienced and competent personnel in the most careful manner. All local ordinances and laws relating to blasting and storing of explosives must be strictly observed. No explosives shall be stored on the project property. All subcontractors shall be notified prior to any blasting. Explosives used shall be subject to approval of the Commissioner. The blasting shall be properly covered with blasting mats. Any blasting required shall be performed at such times as to meet reasonable request of the Commissioner.
- L. Any rock encountered within five feet (5') of pipes or building walls shall be removed without blasting.
- M. Provide adequate temporary crossovers for pedestrians and vehicular traffic including guardrails, lamps, flags, as directed; remove same when necessary for such protection ceases.
- N. Material shall be clean, selected earth obtained either from required excavation or from other sources. It shall be used to backfill excavations up to the proper rough grade level required by elevations shown on the drawings. Excavated material used for fill shall be clean, free of loam containing no boulders or stone over 4" in diameter, nor debris, vegetable matter, roots, sod, scrap metal or glass, refuse or other undesirable matter.
- O. Provide and place any additional fill material from off the site as may be necessary to produce the rough sub-grades required. Fill obtained from off site shall be of kind and quality as specified herein before for excavated material. Providing off site fill shall include furnishing, transporting, placing, and consolidating.
- P. Backfilling:
 - 1. Backfill trenches only after locations of duct banks and appurtenances have been recorded.
 - 2. All lumber, rubbish, and braces shall be carefully removed from excavations before backfilling. Backfill all voids where sheet piling, shoring and bracing is removed.
 - 3. Materials used for backfill shall contain water content proper for compaction. If the materials are dry, add the required amount of water for compaction and thoroughly mix the soils and water. If the materials contain excessive moisture, they shall be allowed to dry until the proper moisture content for compaction is present.
 - 4. For a depth of at least 12 inches above the top of the duct bank, pipe or conduit backfill by hand with earth or granular material. Tamp this backfill thoroughly in layers not exceeding 4 inches in thickness, taking care not to disturb or injure the pipe.
 - 5. For the remaining trench depth, backfill with material as specified in the preceding Section. Compact thoroughly the backfill here referred to with a heavy rammer or an approved mechanical tamper. Backfilling under pavement and other surfacing shall be compacted solidly with mechanical tampers in layers not more than 6" thick, measured loose and each layer shall be compacted to minimum of 95% of the ASTM D1557 maximum density before the next

layer is placed. Backfilled areas in locations to be landscaped or not otherwise specified above shall be compacted to not less than 90% of the referenced density test, or as required, to prevent noticeable shrinkage or settlement.

6. Puddling with water will not be permitted for backfill. Do not attempt compaction when solid is wet with too much moisture or frost in order to avoid rebound and swelling at a later date.

3.18 INTERFERENCE WITH THE OWNER'S NORMAL OPERATION

- A. All work shall be performed in such as not to interfere with the normal work operations in adjacent spaces or buildings.
- B. Do not block or restrict the means of egress of adjacent spaces, decrease the fire ratings of walls, partitions, ceilings, doors or combination thereof of adjacent spaces or means of egress, interrupt safety systems or in any way adversely affect the safety of people or materials.
- C. Provide containment measures to prevent dirt, dust or fumes from reaching adjacent work spaces.
- D. All personnel traffic and material delivery shall be routed so as to absolutely minimize travel through adjacent work areas.

3.19 TEMPORARY SERVICE

- A. Temporary services are specified under DDC general conditions.

END OF SECTION

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SECTION 22 0513 - PLUMBING SYSTEM TESTS

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide Plumbing System Testing as shown on the drawings and as specified herein.

1.03 RELATED WORK

- A. Common Work Results for Plumbing -Section 22 0511
- B. Water Distribution Piping -Section 22 1100
- C. Sanitary, Waste and Storm Drainage -Section 22 1300
- D. Fuel Gas System -Section 23 1000
- E. Automatic Sprinkler System -Section 21 1313

1.04 QUALITY ASSURANCE

- A. Plumbing Code
- B. N.F.P.A. - National Fire Protection Association
- C. A.G.A. - American Gas Association
- D. C.G.A. - Compressed Gas Association

1.05 SUBMITTALS

- A. Certification.

1.06 SPECIFIC REQUIREMENTS

- A. All tests shall be made in the presence of the Architect, or their representatives, and the plumbing inspector, as may be directed; and at least 72 hours notice shall be given in advance of all tests.
- B. The Work of this Contractor shall include the furnishing of all testing instruments, gauges, pumps, smoke machines, and other equipment required or necessary for tests, required by laws, rules and regulations and as specified.
- C. Provide all other tests required by the plumbing inspector.

- D. All appurtenances shall be operated after installation to determine whether or not they meet the requirements of the Specifications.
- E. All defects disclosed in the work by tests and otherwise shall be made good or the Work replaced without additional cost to the Owner. No caulking on screwed joint, cracks or holes will be acceptable.
- F. Tests shall be repeated after any defects disclosed thereby have been made good or the work replaced if it is deemed necessary.
- G. All tests shall be made at the expense of the Contractor.
- H. Tests are not permitted to be made with air except as noted.
- I. Contractor to provide required test plug tee fittings during erection of pipe system.
- J. If the pipe, installation fails to meet testing requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of the tests after the leaks have been corrected.
- K. All piping which is to be enclosed in partitions or hung ceilings shall be tested and made tight when directed by the Construction Supervisor and in adequate time to permit the installation of partitions and ceilings. When necessary, the Contractor shall drain the piping and/or take such precautions as required to prevent damage by freezing.
- L. The Contractor shall also be responsible for the work of other trades that may be damaged or disturbed by the tests, or the repair or replacement of this Work, and he shall, without extra charges, restore to its original condition, any Work so damaged or disturbed.
- M. The Contractor shall be responsible for all tests listed in this Section as well as all Special Tests and Inspections.

PART 2.00 - PRODUCTS

NOT APPLICABLE.

PART 3.00 - EXECUTION

3.01 WORK PERFORMED PRIOR TO TESTING

- A. Water Systems:
 - 1. Flushed, filled and vented.
 - 2. Correct pump rotation.
 - 3. Proper strainer baskets clean and in place.
 - 4. Temporary start-up strainer baskets removed.
 - 5. Service and balance valves open.

3.02 BALANCING

- A. Balance and adjust water systems.
 - 1. Examine system and position valves and cocks in their required open or closed position.
 - 2. Make all adjustments as required to balance system and equipment.
- B. Mark valve tag of each valve or cock used for balancing to indicate position of valve stem.
- C. Make repairs to all leaks or defects without additional cost to the Owner.

3.03 FINAL WATER SYSTEM BALANCING

- A. Provide final balancing and adjustments to water systems after Contractor corrects all deficiencies. Final balancing shall incorporate all Commissioner comments on Preliminary Balancing Report.
 - 1. Make all final adjustments as required to balance system and equipment. Submit report indicating final GPM to all risers and equipment. Report shall indicate final performance characteristics for pumps including total GPM, total dynamic head and actual motor amps.
- B. Mark valve tag of each valve or cock used for balancing to indicate position of valve stem.

3.04 TESTING OF AUTOMATIC CONTROLS

- A. In cooperation with the control manufacturer's representative, adjust controls to operate as specified. Testing personnel shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.

3.05 DOMESTIC WATER SYSTEM STERILIZATION

- A. The potable water system shall be disinfected prior to use. Samples shall be taken as required by the department of health. The method to be followed shall be that as prescribed by the Department of Health, by the following:
 - 1. The pipe system shall be flushed with clean, potable water until no dirty water appears at the outlets.
 - 2. The system or part thereof shall be filled with a water-chlorine solution containing at least 50 parts per million of chlorine and the system or part thereof shall be valved off and allowed to stand for 24 hours or, the system or part thereof shall be filled with a water-chlorine solution containing at least 200 parts per million of chlorine and allow to stand for 3 hours.
 - 3. Following the prescribed standing time, the system shall be flushed with clean potable water until no excess chlorine remains in the water coming from the system.
 - 4. The procedure shall be repeated if it is shown that contamination still persists in the system.
 - 5. Certify through an independent testing laboratory the quality of purity. Submit test results to Architect.

3.06 PIPING SYSTEM TESTS - GENERAL

- A. Each piping system shall be tested prior to application of insulation, painting or placing of backfill. Testing as stipulated herein shall be considered minimum, and where tests stipulated by the New York City Building Dept. exceed these requirements, such more stringent tests shall be performed.
- B. All materials and equipment for testing shall be furnished by the installer of the system. Concealed work shall remain uncovered until required tests have been completed. In the event that the project construction schedule requires it, make arrangements and insert proper sectionalizing devices so that a portion of a system may be tested.
- C. All piping, unless otherwise specified, shall be tested to a hydrostatic pressure at least 2- 1/2 times the maximum designed working pressure (but not less than 50 psig) for a sufficiently long time to detect all leaks and defects, and after testing, shall be made tight in the most approved manner.
- D. Where controls and accessories are not designed to withstand pipe test pressures, they shall be properly protected against damage during such test.
- E. Compressed air piping for temperature control line shall be subjected to an air pressure test of 50 psig and connections checked with soapsuds.
- F. If in any tests leaks are observed, the defective work or material shall be replaced. No caulking of screw joints or holes will be acceptable. Repetition of the entire test will be required as many times as leaks can be observed from the tests, until no leaks result in successful completion of the test.

- G. Make all provisions for removal of test equipment and draining of pipes after tests have been completed. Insulation work shall not be performed prior to inspection and testing of piping.
- H. The Contractor shall inform the COMMISSIONER in writing when a section of piping is to be tested and subsequently insulated or otherwise concealed. Such notice shall be given a minimum of five (5) working days prior to the start of testing.
- I. Where possible, arrange to conduct tests under constant ambient temperature conditions in order that compensation for temperature change is not necessary.

3.07 PIPING SYSTEM TESTS – SPECIFIC

SITE SANITARY AND STORM SEWERS

- A. Test completed sewer lines with light or reflected light. Test shall show clear unobstructed view between manholes. All of the Work will be subject to the final approval of the Architect.
- B. The construction of the sewer line shall be inspected by the Commissioner and plumbing inspector.
- C. The completed sewer systems, including all mains, laterals, and manholes shall be limited to a maximum leakage limit of 100 gallons per inch of diameter, per day, per mile. Amount of leakage for pipe joints shall not exceed that stated in ASTM standards for pipe joints.
- D. Any completed collection system or partial system failing to meet the maximum allowable infiltration requirements shall be reconstructed or sealed in a manner acceptable to the Commissioner and the plumbing inspector.
- E. Low Pressure Testing
 - 1. Test shall be conducted between two (2) consecutive manholes.
 - 2. The test section of the sewer line shall be plugged at each end. One of the plugs used at the manhole shall be tapped and equipped for the air inlet connection for filling the line with compressed air.
 - 3. All service laterals, stubs and fittings into the sewer test section shall be properly capped or plugged, and braced against the internal pressure to prevent air leakage by slippage and blowouts.
 - 4. The air control equipment shall include a shut-off valve, pressure regulating valve, pressure reduction valve and a monitoring pressure gauge having a pressure range from 0 to 5 psi. The gauge shall have a minimum divisions of .10 psi and an accuracy of $\pm .04$ psi.
 - 5. Fill pipe line until a constant pressure of 3.5 psig is maintained. Regulate to prevent the pressure inside the pipe from exceeding 5.0 psig.
 - 6. Maintain internal pressure above 3.0 psig for at least 5 minutes. During stabilization period check all capped and plugged fittings with a soap solution to detect any leakage at these connections.
 - 7. If leakage is detected at any cap or plug, tighten all leaky caps and plugs. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new five-minute interval shall be allowed after the pipe line has been refilled.
 - 8. After the stabilization period, adjust the air pressure to 3.5 psig and shut off or disconnect the air supply. Observe the gauge until the air pressure reaches 3.0 psig. At 3.0 psig commence timing and allow to run until the line pressure drops to 2.5 psig.
 - 9. If the time, in minutes and seconds, for the air pressure to drop from 3.0 to 2.5 psig is greater than that shown in the following table for the designated pipe size, the section undergoing test shall have passed.

Time Requirements for Air Testing

<u>Pipe Size In Inches</u>	<u>Time</u>	
	<u>Min.</u>	<u>Sec.</u>
4	2	32

6	3	50
8	5	6
10	6	22
12	7	39
14	8	56
15	9	35
16	10	12
18	11	34
20	12	45
21	13	30

[For larger diameter pipe use the following: Minimum time in seconds = $462 \times$ pipe diameter in feet.]

10. If the time, in minutes and seconds, for the 0.5 psig drop is less than that shown in the table for designated pipe size, the section of pipe shall not have passed the test.
11. Air pressure correction is required when the prevailing ground water is above the sewer line being tested. Under this condition, the air test pressure must be increased .433 psi for each foot the ground water level is above the invert of the pipe.

3.08 SITE AND UNDERGROUND WATER PIPING

- A. The new water main shall be give pressure and leakage tests in Section of approved length all as directed and approved by the Architect. Hydrostatic and leakage tests shall conform AWWA C600-64 requirements. For these tests, this Contractor shall furnish a water meter and a pressure gauge. This Contractor shall furnish and install suitable temporary testing plugs, valves or caps for the pipeline, all necessary pressure pumps, pipe connections, other similar equipment, and all labor required. All expenses involved in making leakage and pressure tests shall be borne by this Contractor. The meter gauge shall be installed by this Contractor in such a manner that all water entering the Section under test will be measured and the pressure in the Section indicated, and shall be kept in use during both tests. The Sections of pipe to be tested shall be filled with water of approved quantity and all air shall be expelled from the pipe.
- B. The new water main shall be subject to a hydrostatic test of 200 psi gauge, after the pipe is laid and the trench partially backfilled (joints shall be left exposed). The test pressure shall be applied to each valved section and maintained for a period of two (2) hours with no more than 2 psi loss or pressure. If this Contractor cannot achieve the specified pressure and maintain it for a period of two (2) hours, the section under test shall be considered as having failed to pass the pressure test.
- C. If the section tested shall fail to pass the pressure test or the leakage test, or both, this Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, joint, etc., without extra cost to the Owner.
- D. If, in the judgment of the Architect, it is impractical to follow the foregoing procedures exactly for any reason, required modifications in procedure shall be made, but in any event, this Contractor shall be responsible for the ultimate tightness of the lines within the above leakage requirements.

3.09 INTERIOR DOMESTIC WATER SYSTEMS

- A. Domestic cold, hot and hot water circulation system: The entire water supply system shall be tested to a hydrostatic pressure of 150 pounds per square inch or 1- 1/2 times the system pressure, whichever is greater, at lowest point of the water system in the building, and proved tight at this pressure before fixtures are installed. Water supply piping, if in any way concealed by structural work, shall be tested to the aforesaid pressure and proved tight before pipes are concealed.
- B. The test procedure shall be held for a period of not less than two (2) hours. The piping system shall be considered tight if the drop in pressure does not exceed 2 pounds per square inch during the test period. If the pressure drop exceeds 2 pounds, all repairs and alternations in the pipe system necessary to meet the test shall be made.

3.10 DRAINAGE AND VENT PIPING INSIDE BUILDING:

- A. Rough Plumbing: Except for outside leaders and perforated or open jointed drain title (subsoil drains), the piping of plumbing drainage and venting system shall be verified as to materials and shall be tested upon completion of the rough piping installation and proven to be watertight. The Commissioner may require the removal of any cleanout plugs to ascertain that the prescribed pressure has been reached in all parts of the system.
 - 1. Water Test: A water test shall be applied to the drainage system either in its entirety or in sections after rough piping has been installed. If applied to the entire system, all openings in the piping, except the highest opening, shall be tightly closed and the system filled with water to the point of overflow. If the system is tested in section, each opening, except the highest opening of the sections under test, shall be tightly plugged and each section filled with water. No section shall be tested with less than a 10 ft. head of water. In testing successive sections, at least the upper 10 ft. of the following section shall be tested, so that no joint or pipe in the building (except the uppermost 10 ft. of the system) shall have been submitted to a test of less than 10 ft. head of water. The water shall be kept in the system or in the portion under the test for at least 15 minutes before inspection starts; the system shall then be tight at all points.
- B. Finished Plumbing: After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be verified as to materials, and shall be tested and proven gastight by either a smoke test or a peppermint test.
 - 1. Smoke Test: The smoke test shall be made by filling all traps with water and the introducing into the entire system a pungent thick smoke produced by one or more smoke machines. When the smoke appears at stack openings of the roof, these openings shall be closed and a pressure equivalent to a 1" water column shall be maintained for the period of the inspection.
 - 2. Peppermint Test: The peppermint test shall be made by introducing 2 ounces of oil of peppermint into the roof vent terminal of every line or stack to be tested. The oil of peppermint shall be followed at once by 10 quarts of hot water (160 degrees F or higher), whereupon all roof vent terminals shall be sealed. The detection of the odor of peppermint at any trap or other point in the system shall determine the location of any leaks. Persons who have come in contact with oil of peppermint shall be excluded from the test area.

3.11 NATURAL GAS

- A. Low Pressure for 10 minutes without drop:
 - 1. With approved mercury gauge:
 - a. With air at 6" of mercury.
- B. From service valve to meters, 90 P.S.I.G.
- C. High Pressure - As per National Fuel Gas Code as modified by the N.Y.C. Building Code.
- D. Purge all piping after pressure test.
- E. Purge all equipment after piping has been purged.
- F. Radiography shall be performed on all butt welds in gas meter and gas distribution piping operation at pressures exceeding 3 psig, within buildings, in accordance with API 1104-1977 or ASME Section IX Boiler and Pressure Vessel Code, 1980.
- G. The Owner has the option of requiring the testing of welded joints in piping specified below to be performed by means of radiographic inspection. If welds are found to have been improperly made, or excess materials has been extruded into the piping, additional radiographic inspections may be required from the Contractor and all or parts of the work may be rejected. The testing laboratory selected by the Contractor to perform this work shall be acceptable to the Owner.
- H. Applications for payments for the radiographic inspection shall be made on separate blanks without regard for any other work. Each application shall include the certificate of the testing laboratory for each day that the testing laboratory performed testing of welded joints.
- I. Radiographic inspections shall be performed on the following piping systems:

3.12 FIRE SPRINKLER SYSTEM

- A. Before any paint is applied, the fire sprinkler system shall be tested hydrostatically at not less than 200 psi pressure for two (2) hours minimum, and in accordance with all requirements of the New York City Building Code, and NFPA latest edition.

END OF SECTION

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SECTION 22 0514 - ELECTRIC MOTORS AND MOTOR CONTROLLERS

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Electric Motors, Motor Controllers as shown on the drawings and as specified herein, including but not limited to the following.
 - 1. Furnish and install motors required for plumbing equipment.
 - 2. Furnish motor starters required for plumbing equipment.
 - 3. Coordination of the installation of motors and starters.
 - 4. Motor control actuating and actuated devices required for plumbing equipment.
 - 5. All control wiring other than power wiring.

1.03 RELATED WORK

- A. Plumbing equipment.
- B. Electrical specifications for installation of motor starters and power wiring.

1.04 QUALITY ASSURANCE

- A. NEMA
- B. New York City Electrical Code
- C. IEEE

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Wiring diagrams of all manufactured equipment.
 - 2. Electrical equipment terminal-to-terminal point connections.
 - 3. Elementary diagrams.
 - 4. Integrated and coordinate wiring for safety and interlocking controls for motor starters and motor actuating and actuated devices.
 - 5. Motor nameplate data including: Motor horsepower, full load amperes, voltage, number of phases, service factor and locked rotor amperes. Include manufacturers recommended overcurrent device and thermal overload.
 - 6. Provide starter shop drawing indicating manufacturer, size, type, number of poles, and voltage.
- B. Materials Data: Manufacturer's printed data, test data, recommendations and installation.

1.06 DEFINITIONS

- A. Power Wiring (Motor Power Circuit): Power circuit operating at 120 volts or more, and carries electrical input energy to starter and from starter to motor.
- B. Control Wiring (Motor Control Circuit): Other than power wiring, all other wiring intended for directing or indicating the performance of a motor starter, including connections to actuating and actuated devices.
- C. Motor Actuating Device: Any device performing a switching function in a motor control circuit (i.e., pushbuttons, hand-off-automatic switches, automatic contacting devices, time clocks, etc.).
- D. Motor Actuated Device; any device which functions in response to voltage received from a motor control circuit (i.e., pilot lights, solenoids, PE, EP, damper motors, etc.).

PART 2.00 - MATERIALS

2.01 MOTORS

- A. General:
 - 1. Motors shall be of proper power and speed to suit the specified makes of equipment. If other makes of equipment (other than specified) are accepted, the proper adjustment of motor speed and power must be included without additional cost. Sizes and types shall be submitted for approval before the equipment is purchased.
 - 2. Motors shall be open drip-proof, squirrel cage induction motors rated at 1,750 rpm or 3,500 rpm, as scheduled. Where motors are multi-speed, speeds shall be as scheduled or specified.
 - 3. Motors voltage shall be as scheduled or specified.
 - 4. Unless otherwise specified, motors shall be suitable for operation in either direction of rotation.
 - 5. Motors shall be built in accordance with current NEMA standards (MG-1), except as noted in these specifications.
 - 6. Motors shall be NEMA Design B unless otherwise noted.
 - 7. Fractional horsepower motors less than 1/2 HP shall be 120 volt, single phase, 60 Hz. Motors 1/2 HP and above shall be 60 Hz, three phase with voltage as scheduled or specified.
- B. Insulation:
 - 1. Insulation system employed shall have been tested by the manufacturer and will be Class B or F.
 - 2. Temperature rise shall be in accordance with NEMA limits for the Class of Insulation, Service Factor and Enclosure specified.
 - 3. Unless noted otherwise, motors will be rated for 40 degrees C ambient operation.
- C. Mechanical:
 - 1. Motors shall be built in NEMA standard T-Frame sizes.
 - 2. Dripproof and totally enclosed motor frames will be of rugged construction and material will be steel, aluminum or cast iron.
 - 3. End bracket will be of cast iron or aluminum construction and aluminum must have steel inserts in the bearing relubrication.
 - 4. Bearings will be anti-friction type and bearing housings will be equipped with plugged provision for relubrication.
 - 5. Bearings will be rated for minimum L-10 life of 20,000 hours assuming bearing load to be calculated with a NEMA minimum V-belt pulley, so located that the center line of the belt load will be located at the end of the NEMA standard shaft extension.

D. Energy Efficient Motors:

1. Provide high efficiency electric motors for all polyphase dripproof and totally enclosed motors 1 HP and above or. Motor shall have a standard product of an approved motor manufacturer and shall have the following minimum guaranteed full load efficiencies at 1,750 rpm as defined by the latest NEMA standards. Submit certification of motor efficiency with equipment shop drawings. Motors for different rpm's shall be of same construction and comparable efficiency as 1,750 rpm motors.

<u>HP</u>	<u>Minimum Efficiency %</u>
1	82.5
1.5	84.0
2	84.0
3	84.0
5	84.0
7.5	89.5
10	90.2
15	91.7
20	91.7
25	92.4
30	93
40	93
50	93.6
60	94.1
75	94.1
100	94.5

E. Noise Levels:

1. Sound power levels for all motors will be no greater than the guidelines recommended by NEMA Standard MG1-12.49.

F. Tests and Test Data:

1. Motors will be 100% production tested and quality control checked to assure compliance with this specification.
2. The insulation system will be tested by procedure outlined in NEMA Standard MG1-12.03.
3. A load test will be performed on each motor to assure compliance with the energy-efficiency section of this specification.
4. Typical test data on each motor will be available if requested.

2.02 MOTORS STARTERS

A. Fractional Horsepower Starters for Motors less than 1/2 HP:

1. Thermal overload relay with field adjustment capability.
2. NEMA I general purpose enclosure with flush mounted enclosure and plate.
3. Quick-make, quick-break mechanism.
4. Pilot light indicating activation.
5. Speed control, where indicated.
6. Magnetic starter type with HOA switch where required to be automatically controlled by a motor actuating device.

- B. Starter for Motors 1/2 HP and above:
1. Combination magnetic starter with unfused, disconnect switch, unless indicated to be fused, or of the circuit breaker type.
 2. Provide an individually fused transformer to permit external control circuit operation at a nominal voltage of 120 volts. Ground unfused secondary wire.
 3. Provide NEMA I Class A enclosure with running overload relay and disconnect for each pole.
 4. Size fusible switch gaps for the time delay type fusing. For combination circuit breaker. Provide ambient compensating features extending to 50 degrees C.
 5. Magnetic Starters NEMA Size 3 and larger: Equipped with an auxiliary control circuit relay arranged to permit the actuation of the starter without introducing holding coil currents into the external control circuit.
 6. Magnetic Starters NEMA Size 5 and larger, Intended to Operate at a Power Circuit Voltage in Excess of 250 Volts Line-to-Line: Equipped with an integral phase failure protection relay system.
 7. Equip starter with a low voltage, manual reset "lockout" relay arranged to open the main holding coil circuit following a loss of line voltage, and then to maintain contact features (if any) in the external control circuit.
 8. Where specified or scheduled provide reduced voltage starter.
 - a. Locked rotor motor current shall not exceed value given in NEMA Standard MG-1.
 - b. At no time during the starting and running period following initial closing into the line shall be an "open conductor" condition exist in any phase of wiring up to the motor terminals.
 - c. Breakaway and accelerating torque produced by the motor during start-up: Adequate for the mechanical loading on the motor.
 - d. Starter Type: Magnetic, combination reduced voltage autotransformer with fused disconnect switch.
 9. Where motors are specified as multi-speed, provide multi-speed starter with speed and direction selector control switch.
 10. Where motors are specified to be reversible, provide reversing start and direction selector switch.
 11. Combination Type Motor Starters: Equipped with approved padlock and key and a means for double padlocking its manual line disconnect in the open position.
 12. Motor Starters: Equipped with an engraved lamicoid nameplate permanently fastened on the outside of the starter cover, with high white lettering on a black background identifying the motor and system controlled.
 13. In addition to auxiliary contacts required for interlocking or indicating purposes, provide magnetic starters with one normally closed and one normally open additional contacts for future use.
 14. Enclosure Sizes and Wiring Terminals of Motor Starters: Suitable for the application of copper power and control circuit wires.
 15. Motor Starters, which are not part of Packaged Equipment: One manufacturer throughout the project.
 16. Wire all starter control wires for external connection including spare auxiliary to terminal blocks. Each terminal block point is identified with unique number shown also on submitted wiring diagrams.

2.03 MOTOR CONTROL ACTUATING AND ACTUATED DEVICES

- A. Furnish mount and wire up manual control actuating devices and pilot lights required in starter covers.
- B. Motors Control Actuating and Actuated Devices in the Starter Covers: Housed in NEMA Class I general purpose enclosures, except that where intended for use in damp or hazardous locations, provide enclosures of the proper NEMA classification of the conditions. Gang together in a single enclosure and wire up to a terminal block two or motor control actuating or actuated devices at a single location.
- C. Contacts with Motor Control Actuating Devices: Rated at not less than 10 amperes AC at 250 Volts regardless of the actual duty they are required to perform.
- D. Motor control actuated devices intended to operate in conjunction with motors supplied from power circuits having a voltage in the range of 100 to 125 volts and 200 to 250 volts: Suitable for operation in this range.
- E. Pushbuttons: Heavy-duty oil-tight return momentary type. Provide flush mounted in stainless steel faceplate with pilot light and label indicating equipment served, where stations are remotely located.
- F. Selector Switches: Heavy-duty oil-tight maintained contact type.
- G. Pilot Lights: Heavy-duty type with resistor or transformer, equipped with nameplates indicating the operating conditions they annunciate.
- H. Devices such as pushbuttons, pilot light and selector switches, where mounted in enclosure other than the cover of the starter: Equipped with nameplates indicating the motor with which they are associated and their function (on-off, manual-automatic, etc.).
- I. Nameplates: Engraved lamicoid, permanently fastened lettering and a black background.

2.04 APPROVED MANUFACTURERS

- A. Motors: Gould, General Electric, Westinghouse, Baldor, Century or approved equal.
- B. Starters: Cutler-Hammer, Westinghouse, Square D, Allen-Bradley or approved equal.

PART 3.00 - EXECUTION

3.01 INSTALLATION

- A. Coordinate with other work described under "Related Work".
- B. Comply with the requirements of the New York City Electrical Code for the control wiring work.
- C. Install in accordance with the equipment manufacturer's instructions.
- D. Provide all control and interlock wiring for all provided plumbing equipment.

END OF SECTION

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SECTION 22 0523 - GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1.00- GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to the installation of valves as shown on the drawings and as specified herein, including but not limited to the following:
 - 1. Furnish and install valves and accessories.

1.03 RELATED WORK

- A. Common Work Results for Plumbing- Section 22 0511.
- B. Water Distribution Piping- Section 22 1100.
- C. Plumbing Insulation - Section 22 0711.
- D. Sanitary, Waste, and Storm Drainage - 22 1300.

1.04 QUALITY ASSURANCE

- A. UL - Underwriters Laboratory
- B. New York City Building Code
- C. FM - Factory Manual
- D. AWWA - American Water Works Association
- E. ANSI - American National Standards Institute
- F. ASSE - American Society of Sanitary Engineering

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Valves.
 - 2. Valve boxes and accessories.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

A. Exterior valves:

1. Clow
2. Kennedy
3. Stockham
4. Mueller

B. Interior valves:

1. Victaulic
2. Apollo
3. Milwaukee
4. Stockham
5. Crane
6. Watts

2.02 VALVES - GENERAL

- A. Provide all valves and piping accessories required to complete the installation of all plumbing systems indicated on the drawings and as specified.
- B. Provide valve tags and charts 2" diameter, 18 gauge aluminum or brass, embossed numbers filled in with black paint, fastened by heavy aluminum or brass hooks/chains on all valves and controls (except equipment shutoff valves).
- C. To assure uniformity and compatibility, all grooved end valves and adjoining couplings shall be supplied by a single manufacturer.
- D. Exterior domestic and fire protection water piping shall comply with Local Fire Department and Water Company. Exterior valves shall conform to all applicable requirements of American Water Works Association C500-61 Standard for Gate Valves for Fire Water Work Services.
- E. All valves for medical gases shall be U.L. listed and N.F.P.A. approved.

2.03 EXTERIOR FIRE PROTECTION VALVES

- A. Furnish and install all underground control valves and valve boxes for fire protection service and branches as indicated on the Drawings.
- B. 4" and larger:
 1. UL listed, FM approved.
 2. IBBM, mechanical joint ends, 175 psi wwp.
 3. Double disc, parallel seats.
 4. Seats, gaskets, bolts, and nuts per ASTM specifications.
 - a. Kennedy 70X (bell ends), Clow Valve Company, Stockham, or approved equal.
 - b. Kennedy 71X (mech joint ends), Clow Valve Company, Stockham, or approved equal.
- C. Valve Boxes:
 1. Three piece screw type to grade and coated with coal tar pitch.
 2. Kennedy fig. 121, open left, Star Pipe Products, Bingham & Taylor, or approved equal.

3. Cover with word "Fire" cast in.
 4. Valve key of required height. Kennedy fig. 122.
- D. Install valves and valve boxes in piping as shown on the Drawings, and set plumb and centered with boxes placed directly over valves. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box or to undisturbed trench face if less than 4 feet.
- E. Vertical Indicating Post (P.I.V.): Cast iron construction, UL listed and FM approved for trench depth of 3'-6" to 5'-6".
1. Kennedy fig. 54125 thru 54129.
 2. Nibco
 3. Mueller Company
 4. Or approved Equal
- F. 3" and smaller:
1. AWWA, mechanical joint ends, 200 psi wwp, IBBM.
 2. Kennedy fig. 571X, Clow Valve Company, Stockham, or approved equal.

2.04 EXTERIOR DOMESTIC WATER SERVICE VALVES

- A. Furnish and install all underground control valves and valve boxes for water service and branches as indicated on the Drawings.
- B. Gate Valves:
1. 3" and larger:
 - a. AWWA, mechanical joint, 200 psi wwp, IBBM.
 - b. Double disc, parallel seat, with operating nut. Valves open left.
 - c. Glands, gaskets, bolts and nuts per ASTM specifications.
 - 1) Kennedy fig. 571X, Clow Valve Company, Flowserve Corp., or approved equal.
 2. 2 1/2" and smaller:
 - a. Bronze, non-rising stem, 125 psi wwp.
 - b. Walworth No. 4, threaded ends, Milwaukee Valve, Flowserve Corp., or approved.
 - c. Walworth No. 4 SJ, solder ends, Milwaukee Valve, Flowserve Corp., or approved.
 - d. Wheel handle and extension rod or 1 1/4" operating nut.
- C. Install complete with valve boxes and covers set flush with proposed finished grade.
1. Kennedy, Fig. 121, Star Pipe Products, Bingham & Taylor, or approved equal as specified for the fire service. Coated with coal tar pitch varnish and word "WATER" cast on cover.
- D. 2" and smaller for polyethylene pipe:
1. ANSI/AWWA C800.
 2. Brass construction.
 3. Mueller Mark 2 Oriseal with cast iron curb box, Star Pipe Products, Bingham & Taylor, or approved equal.
- E. Deep box type yard hydrants: Cast brass non-freeze with 3/4" inch hose connection, vacuum breaker and a bleed-off connection on valve body to drain the casing, for 5'-0" bury. At least six (6) cubic feet of crushed stone (French drain) shall be provided at the drip valve.
1. J.R. Smith Fig. No. 5810-VB, Woodford Manufacturing, Josam, or approved equal.

- F. As an option all gate valves shall be similar and equal to Stockham G743 0 N.R.S. iron body, bronze mounted, double disc, parallel seat, mechanical joint, with operating nut. Valves shall be open left. Other manufacturers include Jenkins Co., Crane Co., or approved equal.
- G. All valves shall be installed complete with valve boxes and valve plate covers. All of the foregoing shall be included in the price of valves. Valve boxes shall be set so the tops are flush with proposed finished grade. They shall be reset if required to meet finished paving or grade.
- H. All valve boxes, top and bottom sections and covers shall be manufactured by Kennedy, Fig. 121, Pipe Products, Bingham & Taylor, or approved equal as specified for the fire service above coated with coal tar pitch varnish and word "WATER" cast on cover.

2.05 GENERAL VALVE REQUIREMENTS

- A. Asbestos packing and gaskets are prohibited.
- B. Bronze valves shall be made with dezincification resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc shall not be permitted.
- C. Valves in insulated piping shall have 2 inch stem extensions and extended handles of non-thermal conductive material that allows operating the valve without breaking the vapor seal or disturbing the insulation. Memory stops shall be fully adjustable after insulation is applied.
- D. Exposed Valves over 2-1/2 inches installed at an elevation over 12 feet shall have a chain-wheel attachment to valve hand-wheel, stem, or other actuator.
- E. Ball valves, pressure regulating valves, gate valves, globe valves, and plug valves used to supply potable water shall meet the requirements of NSF 61.
- F. Shut-off:
 - 1. Cold, Hot and Re-circulating Hot Water:
 - a. 2 inches and smaller: Ball, MSS SP-72, SP-110, Ball valve shall be full port three piece or two piece with a union design with adjustable stem package. Threaded stem designs are not allowed. The ball valve shall have a SWP rating of 150 psig and a CWP rating 600 psig. The body material shall be Bronze ASTM B584, Alloy C844. The ends shall be solder,
 - b. Less than 4 inches: Butterfly shall have an iron body with EPDM seal and aluminum bronze disc. The butterfly valve shall meet MSS SP-67, type I standard. The butterfly valve shall have a SWP rating of 200 psig. The valve design shall be lug type suitable for bidirectional dead-end service at rated pressure. The body material shall meet ASTM A 536, ductile iron.
 - c. 4 inches and larger:
 - 1) Class 125, OS&Y, Cast Iron Gate Valve. The gate valve shall meet MSS-SP-70 type I standard. The gate valve shall have a CWP rating of 200 psig. The valve materials shall meet ASTM A 126, grey iron with bolted bonnet, flanged ends, bronze trim, and solid wedge disc. The gate valve shall be gear operated for sizes under 8 inches and crank operated for sizes 8 inches and above
 - 2) Single flange, ductile iron butterfly valves: The single flanged butterfly valve shall meet the MSS SP-67 standard. The butterfly valve shall have a CWP rating of 200 psig. The butterfly valve shall be lug type, suitable for bidirectional dead-end service at rated pressure without use of downstream flange. The body material shall comply with ASTM A536 ductile iron. The seat shall be EPDM with stainless steel disc and stem.

- 3) Grooved end, ductile iron butterfly valves. The grooved butterfly valve shall meet the MSS SP-67 standard. The grooved butterfly valve shall have a CWP rating of 200 psig. The valve materials shall be polyamide coated ductile iron conforming to ASTM A536 with two piece stainless steel stem, EPDM encapsulated ductile iron disc, and EPDM seal. The butterfly valve shall be gear operated.
2. Reagent Grade Water: Valves for reagent grade, reverse osmosis, or deionized water service shall be ball type of same material as used for pipe.

G. Balancing:

1. Hot Water Re-circulating, 3 inches and smaller manual balancing valve shall be of bronze body, brass ball construction with glass and carbon filled TFE seat rings and designed for positive shutoff. The manual balancing valve shall have differential pressure read-out ports across the valve seat area. The read out ports shall be fitting with internal EPT inserts and check valves. The valve body shall have 1/4" NPT tapped drain and purge port. The valves shall have memory stops that allow the valve to close for service and then reopened to set point without disturbing the balance position. All valves shall have calibrated nameplates to assure specific valve settings.
2. Larger than 3 inches: Manual balancing valves shall be of heavy duty cast iron flanged construction with 125 psi flange connections. The flanged manual balancing valves shall have either a brass ball with glass and carbon filled TFE seal rings or fitted with a bronze seat, replaceable bronze disc with EPDM seal insert and stainless steel stem. The design pressure shall be 175 at 250 deg F.

H. Check:

1. Check valves less than 3 inches and smaller) shall be class 125, bronze swing check valves with non metallic Buna-N disc. The check valve shall meet MSS SP-80 Type 4 standard. The check valve shall have a CWP rating of 200 psig. The check valve shall have a Y pattern horizontal body design with bronze body material conforming to ASTM B 62, solder joints, and PTFE or TFE disc.
2. Larger than 4 inches and larger:
 - a. Check valves shall be class 125, iron swing check valve with lever and weight closure control. The check valve shall meet MSS SP-71 Type I standard. The check valve shall have a CWP rating of 200 psig. The check valve shall have a clear or full waterway body design with gray iron body material conforming to ASTM A 126, bolted bonnet, flanged ends, bronze trim.
 - b. All check valves on the discharge side of submersible sump pumps shall have factory installed exterior level and weight with sufficient weight to prevent the check valve from hammering against the seat when the sump pump stops.

I. Globe:

1. 3 inches or smaller: Class 150, bronze globe valve with non metallic disc. The globe valve shall meet MSS SP-80, Type 2 standard. The globe valve shall have a CWP rating of 300 psig. The valve material shall be bronze with integral seal and union ring bonnet conforming to ASTM B 62 with solder ends, copper-silicon bronze stem, TPFE or TFE disc, malleable iron hand wheel.
2. Larger than 3 inches: Similar to above, except with cast iron body and bronze trim, class 125, iron globe valve. The globe valve shall meet MSS SP-85, Type 1 standard. The globe valve shall have a CWP rating of 200 psig. The valve material shall be gray iron with bolted bonnet conforming to ASTM A 126 with flanged ends, bronze trim, malleable iron handwheel.

2.06 BACKWATER VALVE

- A. The backwater valve shall have a cast iron body, automatic type ABS valve seat and flapper which are slightly open during periods of non operation. The cleanout shall be extended to the finish floor and fit with a threaded countersunk plug. A clamping device shall be included when the cleanout extends through the waterproofing membrane.
- B. When the backwater valve is installed greater than 600 mm (24 inches) below the finish floor elevation, a pit or manhole large enough for a repair person can enter to service the backwater valve shall be installed.

2.07 BACKFLOW PREVENTERS

- A. A backflow prevention assembly shall be installed at any point in the plumbing system where the potable water supply comes in contact with a potential source of contamination. The backflow prevention assembly shall be ASSE 1013 listed and certified.
- B. UL listed for sized 2 1/2" and larger. AWWA compliant.
- C. Bronze body for 3/4" and 1" size. IBBM for 2 1/2" and larger.
- D. Working pressure and temperature rating: 175 psi and temperature of 140 °F. Unit shall be shipped completely assembled and all valves, check valves, nipples and other fittings shall conform to the piping material in which they are installed.
 - 1. Febco 805, 850 and 870 series.
 - 2. Apollo Vavles
 - 3. Watts
 - 4. Or Approved Equal
- E. Reduced pressure backflow preventers shall be installed in the following applications.
 - 1. Water make up to heating systems, cooling tower, chilled water system, generators, and similar equipment consuming water.
 - 2. Irrigation systems.
 - 3. Deionizers or Reverse Osmosis Water Systems.
 - 4. Sterilizers.
 - 5. Dental Equipment
 - 6. Power washer
 - 7. Atmospheric Vacuum Breaker: ASSE 1001
 - a. Hose bibs and sinks w/threaded outlets.
 - b. Disposers.
 - c. All kitchen equipment, if not protected by air gap.
 - d. Ventilating hoods with wash down system.
 - e. Film processor.
 - f. Detergent system
 - g. Dental equipment
 - h. Fume hoods
 - i. Glassware washers
- F. The atmospheric vacuum breaker shall be ASSE listed 1001. The main body shall be either cast bronze. All internal polymers shall be NSF listed. The seat disc elastomer shall be silicone. The device shall be accessible for maintenance without removing the device from the service line. The installation shall not be in a concealed or inaccessible location or where the venting of water from the device during normal operation is deemed objectionable.

2.08 REDUCED BACKFLOW PREVENTOR

- A. The reduced pressure principle backflow prevention assembly shall be ASSE listed 1013 with full port OS&Y gate valves and an integral relief monitor switch. The main body and access cover shall be epoxy coated duct iron conforming to ASTM A536 grade 4. The seat ring and check valve shall be Noryl, Milwaukee, Victaulic, Crane Co. or approved equal (NSF listed). The stem shall be stainless steel conforming to ASTM A276. The seat disc elastomer shall be EPDM. The checks and the relief valve shall be accessible for maintenance without removing the device from the line. An epoxy coated wye type strainer with flanged connections shall be installed on the inlet.

2.09 DOUBLE DETECTOR CHECK ASSEMBLY

- A. The double check detector backflow prevention assembly shall be ASSE listed 1048 and supply with full port OS&Y gate valves. The main body and access cover shall be epoxy coated ductile iron conforming to ASTM A536 grade. The seat ring and check valve shall be Noryl (NSF listed). The stem shall be stainless steel conforming to ASTM A 276. The seat disc elastomers shall be EPDM. The first and second check valve shall be accessible for maintenance without removing the device from the line.
- B. UL listed, FM approved. AWWA standard C510-92 compliant.
- C. 175 psi: wwp, epoxy coated cast iron flanged body with bronze seats.
- D. UL/FM approved OS and Y, ISSB, flanged gate valves.
- E. Watts no. 709 DCDA with bypass consisting of Watts 007M1, Milwaukee, Victaulic, Crane Co. or approved equal double check valve and 5/8" x 3/4" water meter assembly.

2.10 THERMOSTATIC MIXING VALVE

- A. Self-actuated, self-sensing, three-way type, union ends, manually adjustable, built-in strainer. ASSE 1017 compliant.
- B. Bronze body, 200 p.s.i. working pressure, nickel plated piston, copper actuator bulb and capillary.
- C. Capacity - 25 GPM, pressure drop 2 p.s.i., temperature range - 100 degrees F. to 200 degrees F., set point - 120 degrees F.
- D. Armstrong RADA R series. Size as noted on drawings.
- E. Point of use: ASSE 1016 compliant, brass body, integral check valves, adjustment cap.
1. Watts series MMV, Powers, Symmons or approved equal size as noted on drawings.

2.11 RELIEF VALVES

- A. Provide adjustable bronze spring and diaphragm combination pressure and temperature type relief valves with test level and automatically resetting type thermostatic element. Pipe drain to spill over mop receptor floor drain, janitor sink, or to other safe location.
- B. Relief valves shall be ASME rated.

PART 3.00 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. The entire plumbing and fire protection systems shall be supplied with valves so located, arranged and operated as to give a complete regulating control to all fixtures and apparatus.
- B. Shut-off valves shall be provided on all risers, branch lines and at each piece of equipment whether shown on drawings or not. Install valves with unions, Victaulic couplings, or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Install check and globe valves on downstream side of the shutoff valve on hot water circulating riser and branch lines. Check valves shall be installed for proper direction of flow and Swing Check Valves shall be installed in horizontal position with hinge pin level.
 - 1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to centerline of pipe.
 - 2. Wafer Check Valves: Install between 2 flanges in horizontal or vertical position.
 - 3. Horizontal Lift Check Valve: Install in horizontal piping line with stem vertically upward.
 - 4. Vertical Lift Check Valve: Install in vertical piping line with upward flow with stem vertically upward.
 - 5. Grooved End Spring-Assisted Check Valve: Install in vertical or horizontal piping line with Victaulic couplings.
 - 6. Air Compressor Lift Check Valve: Install in air compressor discharge line.
 - 7. Spring Loaded Horizontal Lift Check Valve: Install in horizontal piping line with stem vertically upward.
- D. Valves shall be located for easy access and shall be provide with separate support. Valves shall be accessible with access doors when installed inside partitions or above hard ceilings.
- E. Valves shall be installed in horizontal piping with stem at or above center of pipe. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward or horizontal plane unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
- F. Valves shall be installed in a position to allow full stem movement.
- G. Valves, where exposed and used in connection with finished piping, shall be same finish as the pipe.
- H. Provide capped drain valves at the heel of each plumbing water riser and at low points of the horizontal mains.
- I. Provide chain operators on all valves 4" and larger located 12'-0" and higher above floor.
- J. Provide shut-off valves and check valves on each pump discharge line and shut-off valve only on each pump suction line.
- K. Install valves where required for proper operation of piping and equipment, including valves in branch lines necessary to isolate sections of piping.
- L. Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.
- M. Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.

- N. Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dialectic insulator. Install bronze valves in steam and condensate service and in other services where corrosion is indicated or can be expected to occur.
- O. Except as otherwise indicated, install gate, ball, globe, and butterfly valves to comply with ANSI B31.1. Where throttling is indicated or recognized as principal reason for valve, install globe or butterfly valves.
- P. Select and install valves with renewable seats, except where otherwise indicated.
- Q. Valve packing shall be adjusted or replaced after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves shall be replaced if persistent leaking occurs. Do not attempt to repair defective valves; replace with new valves.
- R. Provide drains at low points of all liquid piping systems including each riser. Locate drain valves in Mechanical Equipment Rooms not higher than 6' above floor and pipe to nearest floor drain. Provide capped drain cocks with threaded ends for hose connections at all other drain points. Provide one 100' length of heavy-duty 1" hose.
- S. Provide all valves 6" and larger with a rating of over 150 lbs. with a 1" bypass valve of same pressure rating as the bypassed valve.
- T. Provide renewable bronze seat rings and bronze spindles for all cast iron body valves.
- U. If globe valves are not available in the sizes required for installation in the discharge lines from the large pumps, install valves of the lubricated tapered plug type.
- V. Lubricate tapered plug cocks with the manufacturer's proper lubricant for water service before shipment to the job site. Furnish four (4) hand wrenches for each size valve, where gear operators are not required.
- W. Safety valve discharges shall be piped and extended to drains. From the drain and the elbow provide a common 3/4" drain line extended to discharge down 6" above the nearest floor drain.

END OF SECTION

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SECTION 22 0711 - PLUMBING INSULATION

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum and [5] the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide Insulation on Plumbing Piping and Equipment as shown on the drawings and as specified herein, including but not limited to the following:
 - 1. Insulation, jacketing and adhesives for plumbing piping.
 - 2. Insulation, jacketing and adhesives for plumbing equipment.

1.03 RELATED WORK

- A. Water Distribution Piping - Section 22 1100.

1.04 QUALITY ASSURANCE

- A. Federal Specifications - F.S.
- B. Underwriters Laboratories - U.L.

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Insulation Materials.
 - 2. Jackets.
 - 3. Adhesives.

PART 2.00 - PRODUCTS

2.01 INSULATING MATERIALS

- A. All insulation shall have composite (insulation, jacket facing and adhesive used to adhere jacket or facing to the insulation) fire and smoke hazard ratings as tested by Procedure ASTM E-84, NFPA 255 and UL 73, not exceeding flame spread of 25, fuel contributed of 50, and smoke developed of 50. Accessories such as adhesives, mastics, cements, tapes and cloths for fittings shall have component ratings as listed above. Insulation shall be glass fiber with a maximum K factor of 0.23 at 75 degrees F. mean temperature. Density shall not be less than 3 lbs. per cu. ft.
- B. Insulation thickness shall conform to application schedule specified herein for types and thickness.
- C. Pipes subject to freezing: Cover all piping subject to freezing with an additional layer of 2" glass fiber insulation of the same finish as specified for the particular service when not subject to freezing, but not less than 3" total thickness.
- D. The materials as specified below have been selected from Owens-Corning Fiberglass Corp. and are representative of the quality, design and finish desired. Insulation as manufactured by other manufacturers may be submitted for approval, provided the products meet fully in all respects (such as density, moisture absorption, alkalinity, thermal-conductivity, jacket, etc.) to the materials as delineated below.
- E. Fiberglass Pipe Insulation: FS HH-1-558B (Amend. 3), Form D, Type III, Class as indicated. Provide Class 12 for hot and cold plumbing piping.
- F. Fiberglass Pipe Fitting Insulation: FS HH-I-558, Form E, Class as indicated. Provide Class 16 for use with Class 12 pipe insulation, where temperature does not exceed 450 degrees F.
- G. Flexible Unicellular Pipe Insulation: FS HH-I-523, Class T.
- H. Calcium Silicate Pipe Insulation: FS HH-I-523, Type II, except type I where needed, factory applied jacket Class B.
- I. Vapor Barrier Materials: FS HH-B-100B, Type I, paper-backed aluminum foil, except as otherwise indicated, strength and permeability rating equivalent to adjoining pipe insulation jacketing.
- J. Bends shall be 0.016 inch thick, 1/2" aluminum spaced 18" on center, finish cement shall be J-M No. 375 or smooth coat by Insulation Industries, Inc.
- K. Wires shall be 20 gauge galvanized annealed steel, sealer shall be layer of J-M duramesh 207 or equal.
- L. Adhesives and Protection Finish shall be Benjamin Foster 30-36 or Insul-Coustic (I-C).
- M. Jacketing Material for Equipment Insulation: Provide pre-sized glass cloth or canvas material, not less than 7.8 ounces per square yard.
- N. Fitting and Valves: Zeston, Grainger, Knauf or approved equal 25/50 rated - 20 mil. P.V.C. covers over fiberglass insulation.
- O. Weatherproofing finishes for outdoor insulation (Glycol).
 - 1. Outside Piping
 - a. Finish with a 0.16" thick aluminum jacket which has a factory applied moisture barrier. For all applications where it is available, the jacketing shall be factory attached to the insulation and installed per manufacturers' recommendation.
 - b. Where field applied jacketing must be used, it shall be applied with 2" overlap facing down from the weather and shall be secured with an aluminum band (1/2" x 0.020") and seals applied on 12" center with bands applied directly over butt overlaps.

- c. Fittings and valves shall be insulated and finished with mitered sections of the insulation with factory attached aluminum jackets installed per manufacturers' recommendation.

2.02 RELATED MATERIAL AND REQUIREMENTS

- A. At pipe supports Insul-Shield, Buckaroos, Erico, or approved equal pipe saddles and matching hanger shall be used. Joints of insulation abutting Insul-Shielding pipe saddles shall be butted with IC-405, and the joints firmly pressed together.
- B. All concealed and exposed piping shall be provided with factory ASJ (Owens/Corning Fiberglass, Buckaroos, Armacell Engineered Foams, or approved equal) secured in place with vapor barrier adhesive IC-225. Provide 1/2" aluminum bands spaced 18" on centers.

2.03 INSULATION REQUIREMENTS

- A. Cold Water Piping
 1. Cold Water - 1 inch and smaller - 1/2" insulation, A.S. jacket.
 - Cold Water - 1- 1/4" to 2" - 3/4" insulation, A.S. jacket.
 - Cold Water - 2- 1/2" and larger - 1" insulation, A.S. jacket.
 2. Storm drainage piping and drain body - minimum 1/2" insulation, A.S. jacket.
 3. Frostproofed Piping - 3" insulation, dual temperature fire retardant jacket.

- B. Hot Water Piping
 1. Hot Water Supply - 1/2" to 1- 1/4" I.D. - 3/4" insulation, A.S. jacket.
 2. Hot Water Supply - 1- 1/4" and larger - 1" insulation.
 3. Hot Water Circulating - all sizes - 1" insulation, A.S. jacket.

OPTION

- C. Water Piping
 1. 1" insulation, A.S. jacket.
 2. Storm drainage piping and roof drain body: same as for water piping.
 3. Frostproofed Piping 3" insulation, dual temperature fire retardant jacket.
 4. Except as noted insulate all exposed and concealed vertical and horizontal domestic water piping, and all exposed and concealed horizontal storm drainage piping.
- D. Miscellaneous Equipment
 1. Insulate water meter with 4 pound density 1" thick vapor barrier glass insulation blanket, fitted and contour to shape and secured in place with bends or wire. Apply two coats of mineral wool, cement and trowel to a smooth finish, and finish with two applications of Benjamin Foster 30-36 vapor barrier finish.
 2. Hydro-pneumatic tank: 1" thick glass fiber vapor seal board, type 705 faced with FRK jacket 4lb. density, with 1/2" thick finish over vaporseal mastic and finished cement copper-clad hexagonal wire. Domestic hot water generators shall be insulated with Weben Jarco or approved equal "Zip-A-Therm" jacket. Jacket shall have an R-11 thermal rating and conform to ASHRAE standard 90-75. Jacket shall limit heat loss to 13.61 BTU per square foot of tank surface at 130 degrees stored water temperature and 63 degrees F. ambient air temperature.
 3. Insulate domestic hot water storage tanks with 4.2 pound density 2" thick vapor barrier glass insulation blanket, fitted and contour to shape and secured in place with bends of wire. Apply two coats of mineral wool cement and trowel to a smooth finish, and finish with two applications of Benjamin Foster 30-36 vapor barrier finish.
- E. Except as noted insulate all exposed and concealed vertical and horizontal domestic water piping, and all exposed and concealed horizontal storm drainage piping.

PART 3.00 - EXECUTION

- a. Brazed: Made with a brazing alloy (95/5) consisting of copper, silver and phosphorus, and shall conform to Handy Harmon "Silphos" fluxless brazing (1,300 degrees F.) or equal. Brazing material shall meet ANSI/AWS A5.8 Specifications.
- b. Grooved: Victaulic copper tubing sized couplings and fittings. Couplings shall be angle pattern bolt pad type, coated with copper colored alkyd enamel; Victaulic Style 606. Fittings and couplings shall be manufactured to copper tube dimensions. Flaring of pipe ends to IPS dimensions is not allowed. Gaskets shall be FlushSeal design, UL classified in accordance with ASME/NSF 61 for hot and cold potable water systems.
- a. 2. Above ground domestic water piping: Seamless drawn or extruded copper tubing type "L" hard temper ASTM B 88. Fittings 1 1/2" and smaller: Wrought copper or cast bronze, brazing type. Joints shall be made with a brazing alloy (95/5) consisting of copper, silver and phosphorus, and shall conform to Handy Harmon "Silphos" fluxless brazing (1,300 degrees F.) or equal. Brazing material shall meet ANSI/AWS A5.8 Specifications. Fittings 2" and larger: wrought or cast Victaulic type CTS grooved copper fittings. Couplings: Victaulic style 606 Dixon Valve, Romac Industries, or approved equal ductile iron couplings, 300psi wwp.
- B. Subject to local approval, the option is permitted to use roll grooved or cut grooved end pipe with mechanical type joints for the fire protection service and the galvanized steel, and the hard drawn copper tubing water pipe. State in bid materials that are to be provided.
 - 1. For galvanized pipe use galvanized couplings.
 - 2. For copper tubing use copper colored enamel coated ductile iron couplings.
- C. All screwed couplings and shoulder nipples not exceeding 5" in length shall be of the same material as the pipe but of dimensions conforming to Schedule 80.
- D. All fittings used at expansion loops or bends shall be of 250 lb. WSP Class.
- E. Welding fittings shall be of the same material and schedule as the pipe to which they are welded. Welding elbows shall be long radius pattern unless clearance conditions necessitate the use of standard radius pattern. Welded tees shall be used where difference between main and branch are two (2) standard pipe sizes or less. Branch connections shall be reinforced with Weldolets by Bonney Forge and Tool Works or welding saddles by Tube-Turn, Walworth or approved equal. Welding fittings shall be Tube-Turn, Walworth or approved equal.
- F. Unions 2" and smaller shall be screwed unless otherwise noted. Unions 2- 1/2" and larger shall be flanged. If mechanical joint grooved couplings are used, unions are not required. (Couplings shall serve as unions.) Screwed unions on wrought iron and steel pipe, unless otherwise specified, shall be of malleable iron with bronze ground seats suitable for 300 lbs. WSP. Screwed unions on brass pipe shall be brass, ground joint suitable for 300 lbs. WSP. Flanged unions shall be malleable iron, gasket type suitable for 150 lbs. WSP. Unions shall be as manufactured by Crane, Walworth or approved equal.
- G. Flanges shall be of the same weight as the fittings and valves in each service category. Welding neck flanges shall be used with flanged equipment, etc., on welded lines. All flanges shall be drilled in conformance with ANSI B16.5, 125 lb. or 300 lb. standard steel. Welding flanges shall be of steel. Laps shall be machined on front, back and edge and loose flanges have face and bore machined. Screwed flanges shall be faced perpendicular to adjoining pipe.
 - 1. Flange adapters for grooved end steel pipe shall be complete with pressure responsive synthetic rubber gaskets. Flange adapters shall be Class 150, Victaulic Style 741. Flange adapters for use with copper tube shall be Class 150, Victaulic Style 641.
- H. Flange joints shall be faced true, packed and made up perfectly square and tight. Each flange joint shall be provided with best grade steel bolts with square forged heads and with cold-pressed semi-finished hexagon nuts. Bolts and nuts shall be dripped in a mixture of graphite and oil, just before installation. All threads shall be U.S. Standard Gaskets shall be one-piece ring type 1/16" thick full face, suitable for temperature, pressure and service of systems.
- I. Dielectric Fitting: Dissimilar connections shall be made with an insulating dielectric material such as Teflon or neoprene between copper, brass or bronze and black steel pipe.
- J. Fittings:

1. Cast iron threaded drainage: Recessed pattern, ANSI B-16.12.
 2. Malleable iron: Threaded and banded, standard weight except as noted, ANSI B-16.3.
 3. Cast iron threaded: Standard weight, except as noted, ANSI B-16.4.
 4. Cast iron flanged fittings and flanges: Standard weight except as noted, ANSI B-16.1.
 5. Ductile iron grooved: ASTM A-536.
 6. Steel grooved: Forged steel or fabricated steel ASTM A-53.
 7. Steel welding: Standard weight seamless steel, ANSI B-16.9 and ASTM A-234.
 8. Steel flanges: ANSI B-16.5.
 - a. ASTM A-181 Grade I up to 300 psi.
 - b. ASTM A-105 Grade I, 400 psi and above.
 9. Grooved end fittings for copper tubing: Wrought copper conforming to ASTM B-75, B-152, and ANSI B16.22 with copper tubing sized grooved ends designed to accept Victaulic couplings.
 10. Flange adapters for grooved end pipe: Ductile iron ASTM A-536, with synthetic rubber pressure responsive gasket.
 11. Couplings for grooved end pipe:
 - a. For steel pipe: ASTM A-536 ductile iron housings, with synthetic rubber pressure responsive gasket. (Rigid type with angle-pattern bolt pads, or flexible type where required.)
 - b. For copper tubing: ASTM A-536 ductile iron, with synthetic rubber pressure responsive gasket of a FlushSeal design, and angle pattern bolt pads. Coupling housings coated with copper colored alkyd enamel. Couplings shall be copper tubing sized.
- K. Unions:
1. Ground joint type.
 2. Brass for brass pipe and copper tubing.
 3. Galvanized malleable iron with brass seats for iron pipe.
 4. If mechanical joint grooved couplings are used, unions are not required. (Couplings shall serve as unions.)
- L. Press Fittings (Copper)
1. Contractor at his option may provide press fittings in lieu of soldered or brazed fittings and joints for the following systems:
 - a. Domestic cold water
 - b. Domestic hot water
 2. Press fittings for copper shall only be used for piping up to 4 inch and for piping rating no more than 250 degrees and 200 psig.
 3. Press Fittings: Bronze or copper shall conform to the material requirements of ASME B16.18 or ASME B16.22, and the performance requirements of IAPMO PS117, and ICC LC1002. Press fittings 1/2-inch thru 4-inch for use with ASTM B88 copper tube type K, L, or M and 1/2-inch up to include 1-1/4-inch annealed copper tube. Press fittings shall have an EPDM sealing element and Smart Connect (SC) feature. 2-1/2-inch thru 4-inch shall have a 420 stainless steel grip ring, PBT separator ring, EPDM sealing element and Smart Connect (SC) feature. Sealing elements shall be verified for the intended use.
 4. Press fittings with EPDM sealing element shall conform to NSF 61-pw-G when installed in a potable water system.
 5. All fittings shall be provided with a five year warranty that shall include consequential damages.
 6. Press fittings shall be by ProPress by Viega, Nibco, Menards or approved equal.

2.04 PIPE EXPANSION COMPENSATORS

- A. Any breaks or damage to the piping system or to the Work of other Sections within the period of the guarantee due to improper provision for expansion and contraction must be replaced at this Contractor's expense.
- B. This Contractor is to provide for expansion of pipes by providing expansion compensators and/or expansion loops and shall provide anchors at pump discharge and suction lines. All expansion loops shall be pre-stressed.

- C. At connections of branches to water mains, risers and at connections to heaters, coolers and other equipment, and at risers, provide sufficient number of elbow swings to allow for proper expansion and contraction of piping.
- D. Provide in hot water recirculation pipe lines (except at building expansion joints) 3 inches and smaller and for system pressure less than 51 psi, Flexonics or an approved equal Model HP expansion compensators having two-ply phosphor bronze elbows and brass shrouds and end fittings, as manufactured by U.O.P. Flexonics Division, Bartlett, Illinois. All internal parts shall be of non-ferrous metals. Compensators shall have integral guides extending the full length of the bellows travel. Compensators shall have external positive anti-torque devices to prevent twist. All compensators shall be listed under NSF standard 61.
- E. Provide in hot, hot water recirculation piping, except at building expansion joints, etc., pipe lines 4 inches and larger and for system pressures exceeding 50 psi, Flexonics controlled-flexing expansion joints as manufactured by U.O.P. Flexonics Division, Bartlett, Illinois, or approved equal, with plate steel flanges having ANSI drilling, pipe nipple ends beveled for welding, forged steel ANSI flanges to suit the installation. The bellows shall be hydraulically formed from a stainless steel reinforcing neck ring and control rings shall be of a design to limit movement of each corrugation, as well as to carry loop stress caused by internal pressures. Where required, the bellows shall be annealed and/or stress relieved. Before assembly, the corrugated bellows shall be pickled to remove all scale formed by annealing and passivated to provide the maximum corrosion resistance. All lines in which expansion joints are installed must be securely anchored and guided in accordance with manufacturer's recommendations.
- F. Expansion joints for grooved end steel pipe:
 - 1. 2" Through 6": Packless, gasketed, slip-type expansion joint with grooved end telescoping body for installation with Victaulic Style 07 rigid couplings. Provides axial end movement to 3", designed for water services up to 230°F and working pressure to 350 psi. Victaulic Style 150 Mover, Romac, Metroflex, or approved equal.
 - 2. ¾" Through 24": Combination of short nipples and Victaulic Style 75 or 77 flexible couplings joined in tandem for increased expansion. Joint movement and expansion capabilities determined by number of couplings/nipples used in the joint. Pressure rating dependent on size and style of flexible couplings used. Victaulic Style 155, Romac, Metroflex, or approved equal.
- G. Expansion joints shall be manufactured by ADSCO, Barko, Flexonics, or approved equal.

2.05 DRIP PANS

- A. 18 gauge galvanized sheet steel, reinforced, properly supported watertight with 1- 1/4" drain.
- B. Provide under piping where impossible to route water or drainage piping to avoid passing over or within 5 feet of electrical apparatus and in rooms containing only electrical equipment.
- C. Provide under all ground floor plumbing offsets and where indicated on plans.
- D. Provide under all sanitary piping in commercial kitchen and where indicated on plans.

2.06 GALVANIZING

- A. Hot process inside and outside of pipe with zinc coating, minimum 2 ounces per sq. ft.
 - 1. In accordance with American Hot-Dip Galvanizers Associations.

2.07 CHROMIUM PLATING

- A. Use full iron pipe size chrome plated brass piping for exposed water piping connecting fixtures.
- B. In accordance with U.S. Government Standards under license from Chrome Corporation of America.

- C. Clean material and polish before plating.
- D. Plating: Heavy, evenly applied, guaranteed not strip or peel.
- E. Brass or Copper Plating: Nickel plated before chromium plating, ASTM B-281, B-456.
- F. Finish: Polished or satin as noted.

2.08 TRAP SEAL PRIMER AND PIPING:

- A. Cast bronze, 1/2" connection, J.R. Smith #2699. Provide at all floor and funnel drains.
- B. Pipe: Copper tube, ASTM B88, type K, hard drawn.
- C. Fittings: Bronze castings conforming to ANSI B16.18 Solder joints.
- D. Solder: ASTM B32 composition Sb5. Provide non-corrosive flux.

2.09 STRAINERS

- A. Provide on high pressure side of pressure reducing valves, on suction side of pumps, on inlet side of indicating and control instruments and equipment subject to sediment damage and where shown on drawings. Strainer element shall be removable without disconnection of piping.
- B. Water: Basket or "Y" type with easily removable cover and brass strainer basket.
- C. Body: Smaller than 3 inches (80 mm), brass or bronze; 3 inches (80 mm) and larger, cast iron or semi-steel.

2.10 DIELECTRIC FITTINGS

- A. Provide dielectric couplings or unions between ferrous and non-ferrous pipe.

2.11 WATER HAMMER ARRESTER:

- A. Closed copper tube chamber with permanently sealed 60 psig (410 KPa) air charge above a Double O-ring piston. Two high heat Buna-N O-rings pressure packed and lubricated with FDA approved silicone compound. All units shall be designed in accordance with ASSE 1010 for sealed wall installations without an access panel. Size and install in accordance with Plumbing and Drainage Institute requirements (PDI-WH 201). Provide water hammer arrestors at:
 - 1. All groups of two or more flush valves.
 - 2. All solenoid valves.
 - 3. All quick opening or closing valves.
 - 4. All medical washing equipment.

2.12 VACUUM BREAKERS

- A. Install with any plumbing fixture or equipment, in each potable water supply outlet that may be submerged, or subject to back-siphonage, backflow, or that cannot be protected by a minimum air gap, or as directed by the New York City Health Department. Install in strict accordance with The New York City Plumbing Code.
- B. Provide approved type vacuum breaker of the following type:
 - 1) Air gap -ANSI A112-1.2.
 - 2) Vacuum Breaker -ANSI A112.1.1
- C. Vacuum breaking devices shall be readily accessible, in the same room with the fixture they serve.

- D. Provide vacuum breakers for all serrated tip water outlets, hose and faucets, on piping supplying fixtures and equipment below the overflow level and interconnections with other systems which as make-up water supplies to heating or cooling systems.
- E. Install vacuum breakers on piping to boiler make-up, cooling tower make-up, pump cooling and similar connections subject to back pressure. Vacuum breakers shall be similar and equal to Watts Model No. 9D for 1/2" and 3/4" sizes and Watts Model No. 900 for pipe sizes 1" and larger.
- F. In addition to the vacuum breaker, provide an approved check valve on the supply side of the vacuum breaker.
- G. The following outlets are exempt from the above requirements: hose bibbs for drainage of low points of piping systems, and drains from hot water storage tanks.
- H. Hose connected vacuum breakers must assure against backsiphonage by relieving water under pressure when hose end is closed off. Unit shall be all brass construction, finished to match existing piping with either male or female inlet and hose-end outlet connection.

2.13 HOSE BIBBS

- A. 1/2" chrome-plated angle valve with integral stop, renewable seat, composition washer, metal handle, vacuum breaker and 3/4" hose thread and wall flange on concealed piping.
 - 1. Speakman S-5911, Chicago Faucet, Woodford Manufacturing, or approved equal.

2.14 WALL HYDRANTS

- A. Anti-freeze type. All bronze with bronze working parts throughout, renewable nylon seat, nickel bronze face, operating key, vacuum breaker.
 - 1. J.R. Smith 5509QT- WC-W-NB, 3/4" with flush box, cover and frame. Finish as specified by Commissioner.
 - 2. J.R. Smith 5609QT, exposed type. Finish as specified by Commissioner.

2.15 WATER METER

- A. AWWA Standard C700-90 approved:
 - 1. Compound type, cast bronze maincase, bronze operating parts, flanged ends:
 - a. Neptune Tru/Flo, sizes 2" through 6".
 - b. Provide with remote reading and billing accessories.
 - 2. Provide with plate strainer.
- B. Plate Strainer: Similar to Neptune
- C. Basket Strainers: Flanged cast-iron body clamped top and removable basket of perforated copper or stainless steel, similar to Bailey type 2.

2.16 FLOW CONTROL FITTINGS

- A. Provide flow control fittings as manufactured by the Dole Valve Company or approved equal. Flow control valves are to be installed in accordance with the manufacturer's recommendations and shall be provided for all sinks, lavatories and electric water coolers.
- B. All lavatories: Dole Model #FMA 3/8" male pipe inlet and 3/8" female pipe outlet for rigid hot and cold supply risers. Flow rate 0.5 gpm.
- C. All sinks including equipment with sinks, mop receptors, service sinks and kitchen sinks, showers: Dole Model #FMC male pipe inlet and 1/2" female pipe outlet for hot and cold supply risers. Flow rates 4 GPM for service sinks and mop receptors 3 GPM for kitchen and casework sinks, 2.5 gpm for showers.

- D. Electric Water Coolers; Dole Model #F3/4C male pipe inlet and 3/8" female pipe outlet for cold supply riser. Flow rate 0.5 gpm.
- E. All exposed to view flow control fittings shall be chrome plate nickel, or nickel plated.

2.17 PRESSURE AND TEMPERATURE GAUGES

- A. Base Names Manufacturer – Trerice
- B. Pressure and temperature gauges shall be located as shown on the drawings and as indicated below:
 - 1. Pressure Gauges:
 - a. High and low pressure side of pressure reducing valve.
 - b. Discharge side of water meter, provide tee and capped valved connection on inlet side.
 - c. Hot water tank.
 - d. Compound gauge at suction side of each pump.
 - e. Install capped tee with needle valve at discharge side of each pump for future pressure gauge.
 - 2. Temperature Gauges:
 - a. Hot water supply and return piping at hot water tank.
 - b. Downstream side of mixing valve to indicate mixed water temperature.
- C. Pressure gauge shall be 4- 1/2" diameter with aluminum case, chrome ring, white background dial with black markings, glass window, micrometer pointer, stainless steel movement, 1/2 % accuracy over full scale range, phosphor bronze bourdon tube, 1/4" N.P.T. brass socket, bottom or back outlet, 0 psi to 200 psi for straight pressure gauge, 30" of vacuum to 300 psi for compound range – Trerice #500X. Gauges to be used on sewage or storm water system shall be Trerice #500X with Trerice #877-2 diaphragm seal. Pressure and compound gauges shall be installed with Trerice #872-2 snubbers and Trerice #735 needle mounted using copper tubing.
- D. Temperature gauge shall be 4- 1/2" diameter with aluminum case, polished chrome ring white background dial with black markings, glass window, red tipped aluminum pointer, 7/16" x 2- 1/2" copper bulb, 1/2" N.P.T. brass union connection, adjustable angle direct mounted or adjustable angle bracket mounted with 5'0" bronze armored copper capillary as required, 30 degrees F. to 240 degrees F. Dial range. Trerice No. V80445 or V80341 as required.
- E. Other acceptable manufacturers – Taylor, Wexler.

2.18 MISCELLANEOUS MATERIALS

- A. Galvanized Sheet Steel: ASTM A525.
- B. Cement: ASTM C-150.
- C. Sand, Stone and Gravel for Concrete: ASTM C-33.
- D. Sand for Mortar and Grout: ASTM C-144.
- E. Reinforcing Rods: ASTM A-615.
- F. Reinforcing Wire Mesh: ASTM A-185.

PART 3.00 – EXECUTION

3.01 INSTALLATION OF PIPING

- A. Water Service:

1. Arrange with the Water Department and pay for the installation of the connection to the water main approximately as located on the contract drawings. From this connection extend into the building, with curb box, indexed valve box, post indicator valve, etc., as required.
2. Install complete cold and hot water system as indicated on the drawing as required.

B. General:

1. Piping: Installed in neat and workmanlike manner parallel to walls, column center lines but sloped to drain. Work of each trade shall be fully coordinated to provide the design systems without interference between systems. Piping shall be accurately cut, reamed and threaded with sharp dies. Install copper piping in accordance with best practices requiring accurately cut clean joints and soldered in accordance with the recommended practices for the materials and solder employed.
2. Piping shall be installed so as not to interfere with diffusers and electrical lightning outlets which must be accurately centered and located. Special attention shall be given to piping above ceilings, which must be kept a sufficient distance from the lighting outlet to permit later installations of the lighting fixtures and their reflectors fixtures, piping and equipment.
3. Arrange and install piping as indicated, straight, plumb, free of traps, and as direct as possible, form right angles on parallel lines with building walls. Keep pipe close to walls, partitions and ceilings, offset only where necessary to follow walls, as directed.
4. Locate groups of pipes parallel to each other and space them at a distance to permit access for servicing valves. Risers shall not have couplings in runs from one floor outlet to the next.
5. The installation of copper tubing shall be accomplished in such a way as to not touch or come in contact in any way with ferrous metals. Where copper tubing piping or fittings may come in contact with ferrous metal anchors, supports or construction, an insulating non-conductor spacer, similar to lead, rubber or an approved equal, shall be installed to assure prevention of electrolysis.
6. Piping size change shall be accomplished by reducing ell, reducing tee. Eccentric reduction shall be applied in all piping requiring continuous drainage such as steam, condensate and blowdown piping. Concentric increasers shall be used where flow is in direction of increased size. Provide eccentric reduction, top flat, at pump suction reductions.
7. All welding piping shall be butt welded at circumferential joints. Flanges shall be weld-neck type or slip-on type flanges. Materials and methods for each type and class of piping are generally specified for particular services in this specification.
8. Companion flanges or Victaulic couplings at equipment or valves match flanges construction of equipment or valve. Raised face shall be removed at companion flanges when attached to flanges equipped for flat face construction.
9. Gaskets and bolting shall be applied in accordance with the recommendations of the gasket manufacturer and bolting standards of the Code for Pressure Piping (ANSI B31.1.0-1967 par. 108, 135). Strains shall be evenly applied without overstress of bolts.
10. Screw threads (ANSI B31.1.0 par. 135.4) shall be made up with piping compound or other sealing method approved to assure tight joints without overrun of thread into fittings. Compounds shall be approved for service application.
11. Threaded pipe shall be carefully cut, reamed or filed out to size of bore removing all chips, worked into place without springing. Provide Teflon tape on the male thread only. Threaded joints when tight shall not expose more than two full threads.
12. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
13. Copper tubing shall be worked into place without springing.
14. Dielectric couplings or brass adaptors suitable for dielectric service shall be provided at pipe connections between steel or cast iron piping and copper piping.

C. Prevention of Water Contamination:

1. Water supply connections to plumbing fixtures and equipment.
 - a. Provide over-rim water supplies whenever possible.
 - b. Provide following with approved vacuum breakers and/or check valves or backflow preventors as noted or required.

1. Necessary below-rim connections.
 2. Hose connections.
 3. Connections or outlets for HVAC piping systems.
 - c. Approved air gaps on water piping where noted or required by local authorities.
 2. Equipment supplied under other sections of work and/or by Owner, and having below-rim water supply connections, may not arrive on job in Code-approved condition.
 - a. Provide missing vacuum breakers and/or check valves, or relocate same to Code approved positions.
- D. Connections to Equipment:
1. Flanges, unions or threaded adapters.
- E. Branch Water Connections:
1. Provide three elbow swing connections for all water lines connecting to mains, sub-mains or branch mains.
- F. Expansion Requirements:
1. All piping shall be installed throughout the project with due regard for expansion to prevent damage to the building, equipment and piping. Provide anchors, loops or approved type expansion joints where indicated or required for the accurate control of movement.
 2. Branch connections to mains for risers shall be made with minimum of three 90 degree elbows.
 3. Bullhead connections in any piping service are expressly prohibited.
 4. Expansion pipe loops shall be supplemented with adequate guides as close to loops as possible to preserve alignment and pitch.
 5. Securely support pipe anchors, constructed of steel angles and channels, required to keep pipe movement within area of expansion provision. Submit anchor details for approval before installation.
 6. Provide adequate expansion allowance for service temperatures and piping materials.
 7. When installing piping with loop or bend expansion, subject piping to cold spring, which will take care of about half of total expansion between hot and cold conditions. Make riser offsets in manner to avoid pocket forming due to expansion. Submit anchor details for approval before installation.
 8. Expansion and contraction of grooved IPS steel piping systems shall be provided with loops or bends consisting of (8) Victaulic Style 75 or 77 flexible couplings, (4) grooved end 90 degree elbows, and grooved end pipe spools provided in water systems to 230°F in accordance with Victaulic recommendations for expansion compensation.
- G. Concealed Piping:
1. Where so indicated or specified, piping shall be concealed in building construction. Install such piping in time so as not to cause delay to work of other trades, and allow ample time for tests and approval, do not cover before approval is obtained. Wherever possible, run branches passing through floor into partitions, offset above floor close to equipment and expose only as much as necessary for final connection.
 2. Where furred spaces are indicated, keep pipes as close to structural members as possible so as to acquire minimum furring. In case of furred beams, obtain approval of resulting headroom clearance before installing pipes. This Contractor is cautioned to check clearances on General Construction Drawings.

3.02 WELDING

- A. Welding Process: All welding shall be done by the oxyacetylene or electric arc welding process in accordance with the requirements set forth in Welding or Pipe Joints of the ASME Code for Pressure Piping.
- B. Beveling and Welding: All steel pipe 2-1/2" and larger may be purchased mill beveled or shall be machine beveled on both ends before welding. On odd lengths of pipe, beveling may be accomplished by means of the oxyacetylene cutting torch providing all paint, rust, scale and oxide are carefully removed with hammer, chisel or file. Joints shall be prepared and welded to assure thorough fusion

with bare metal, complete penetration, maintenance of alignment, and the production of a joint that shall develop the full strength of the pipe and shall develop the full strength of the pipe and shall be leakproof in service.

- C. Welding Rods: The welding rod used for welding shall be Oswald No. BT or approved equal.
- D. All foreign matter shall be removed from the ends of pipe lengths before tacking and welding. Pipe lengths shall be lined up straight and abutting pipe ends shall be concentric. Spacing and tuck welding shall be such as to prevent the pipe from lapping or getting out of alignment during welding operation.
- E. All welding shall be done in accordance with the latest accepted practice applicable to the particular service and shall be performed only by welders who have been tested and qualified in accordance with the requirements of the ACA Piping Code for Welding. The Contractor shall furnish a certificate for each welder, certifying that the welder complies with these Specifications and of the National Certified Pipe Welding Bureau.
- F. Welders shall be licensed by New York City and certified by the American Welding Society.
- G. The welding of high pressure piping shall be under Special Inspection as required by the Building Code.

3.03 STRAINERS

- A. Provide approved self-cleaning strainers in inlet connections to each feeder and make-up connection, each automatic control valve and all automatic devices whose proper functioning would be affected by solids in the fluid.
- B. Except as noted, strainers in water lines to be Y-pattern set in a horizontal (or vertical downward) run of the pipe. Where it is not feasible, strainers may be of enlarged cross-section flat type. In all case, arrange strainers as not to "trap" pipes, and to facilitate disconnection and opening-up for cleaning.
- C. Provide approved valved dirt blowout connection for each strainer. Each valve located at hand-height and piped to the nearest floor drain, at a point where there is no risk of flooding or damage.
- D. Clean the strainers as necessary until accepted by the Owner.
- E. Install strainers upstream of automatic control valves with the same size as the inlet pipe serving the control valve.

3.04 AIR VENTS

- A. Provide soft temper copper tube pigtail on manual vents so that end can be placed over a bucket.
- B. Provide all manual air cocks and automatic air vents required throughout the water circulating system for the removal of air, of ample strength for the pressure to which they will be subjected. Provide automatic air vents at all high points.
- C. Provide air vents of the compression type, all bronze construction, key operated. Provide each heat transfer element supplied with water with not less than 1/2" manual air vent. Furnish ten (10) keys. Provide air chambers where indicated.
- D. Use inverted ball float traps for vent water risers, mains and branches and where required. Trap Size: 3/4" with inlet an overflow connections, both valved.
- E. Provide manual air vent valves in the piping connections to each hot water heating coil and each chilled water coil (both supply and return where such are not automatically vented). Provide a 1/4" vent line from each air vent to nearest floor drain, or as directed, to suit job conditions.
- F. Provide gate valves with capped bibb connections at all drain points. Hose bibbs only will not be acceptable. Install capped drains at all low points of the systems. Threads of hose bibbs to fit standard rubber hose connection.

3.05 INSTALLATION NOTES FOR SITE PIPING SYSTEMS

- A. All piping and fitting shall be installed straight, and all joints shall be kept free from dirt and grit.
- B. After trench has been excavated in accordance with these Specifications, pipes may be rolled to the trench, but shall be carefully lowered by suitable rigging and placing as herein provided. Pipe shall not be rolled into trench.
- C. All straight pipe and special castings shall be cleaned by brushing and by washing out all foreign matter prior to laying. If the Commissioner so directs, a proper mandrel shall be provided by the Contractor which shall be drawn forward as each pipe or special casting is laid. All branches and other openings shall be stopped up by wooden plugs or heads until either connected or capped. Pipe and special casting shall be laid to required line or grade. Where necessary, temporary wood blocking shall be used; such blocking to be removed as backfilling progresses. Whenever it is necessary to connect with or relay existing water mains, such connections or alternations shall be made by Contractor as specified herein.
- D. All taps and connections that are started must be completed before the closing down of operations at the end of the work day.
- E. Plug or cap any remaining open ends which result from the removal of existing pipe which is to be abandoned. The open ends shall be plugged or capped with cast iron plugs or caps. Live ends of pipe shall be plugged or capped and backed with concrete to provide sufficient bearing equal to the pressure in the pipe times the area of the pipe as directed by the Commissioner.
- F. All water lines shall have at least 4'-0" cover at all points. These depths shall be increased where necessary for making connections or for avoiding subsurface structures, drainage, sewer or other facilities or where frostline is greater.
- G. Piping shall be properly aligned, graded and supported. Piping shall be of correct lengths to permit the joints to be made up without springing or forcing. Change in direction shall be made by use of fittings. Piping shall not be deflected from a straight line at joints in either horizontal or vertical plane, except as authorized by the Commissioner, and not to exceed the recommendations of the manufacturer.
- H. During construction temporary plugs or caps shall be installed in completed portions of the piping as directed by the Commissioner. All portions of the Contractor's work shall be carried out so as to prevent the entrance of dirt or other foreign matter into the system.
- I. Make all crossings as required by conditions encountered during construction at no additional expense to the Owner, including, but not limited to telephone conduits, cold water distribution, electric service, sanitary sewers, storm water drains and steam tunnels, etc.
- J. The work includes providing material and labor for the installation of elbows, tees, short lengths of pipe, concrete thrust blocks, concrete encasement or supports and such other incidental which will provide an adequate clearance from an existing utility line and/or sufficient cover.
- K. Be responsible for all damage to utilities and repair same at his own expense to the satisfaction of the Commissioner.
- L. Provide vertical and horizontal separation between new sewers and water mains in accordance with Codes and Standards requirements.
- M. Reaction or thrust backing shall be applied at all bends, tees, reducers, plugs, caps, valves and dead ends for the water main. Size and shape of concrete backing shall be as approved by the Commissioner, but in any case shall be sufficient to provide bearing equal to the pounds of pressure multiplied by the cross-sectional area of the pipe.
- N. Backing shall be of concrete and shall be placed between solid ground and the fitting to be anchored. Backing shall be placed so that the pipe and fitting joints will be accessible for repair, unless otherwise directed by the Commissioner. Provide tie rods set into concrete. Provide one layer of tar paper between fitting and concrete.

3.06 INSTALLATION NOTES FOR INTERIOR PIPING SYSTEMS

- A. It is the intent that each part of the plumbing systems shall be complete in all details and all lines provided with all control valves as indicated on Drawings, or as may be required for the proper control of the pipe lines under this Section so that any fixture, line or piece of apparatus may be removed for repair without interference or interruption of the service to the rest of the building.
- B. The size of storm, soil, waste, water, and vent piping shall be as determined by the local rules and regulations for plumbing and drainage, except where specifically noted to be larger by the Specifications or plans; and all fixed rules of installation as set forth in the Rules and Regulations shall be followed as part of the Specifications.
- C. Carefully examine the architectural plans and details and become familiarized with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.
- D. Do not permit piping to be exposed beyond finished plaster lines unless specifically shown on Drawings. Consult with the other trades in the building and install piping in such a way as to least interfere with the installation of other trades.
- E. Do not conceal or insulate piping until all required tests have been satisfactorily completed and work has been approved by the Commissioner and all other authorities having jurisdiction.
- F. Where complete concealment is impossible because of obstruction such as beams, ducts, lights, piping, do not install any work before first consulting with the Commissioner and his instructions (written or revised drawings) shall be followed.

END OF SECTION

SECTION 22 1300 - SANITARY, WASTE, AND STORM DRAINAGE SYSTEMS

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide Drainage Systems as shown on the drawings and as specified herein.
 - 1. Complete Sanitary Systems:
 - a. Connection to street sewers.
 - b. Connections to plumbing fixtures.
 - c. Connections to equipment requiring same.
 - d. House drain, house traps.
 - e. Floor drains
 - 2. Complete Storm Water Drainage Systems:
 - a. Connection to street sewers.
 - b. Gutters and roof drains.
 - c. Leaders and house drains.
 - d. Connections to roof drains.
 - e. Floor drains.

1.03 RELATED WORK

- A. Common Work Results for Plumbing - Section 22 0511
- B. General Duty Valves - Section 22 0523
- C. Plumbing Fixtures - Section 22 4000
- D. Plumbing Insulation - Section 22 0711
- E. Plumbing Equipment and Accessories - Section 22 3000
- F. Plumbing Tests - Section 22 0513
- G. Motors and Motor Controllers - Section 22 0514

1.04 QUALITY ASSURANCE

- A. A.N.S.I. - American National Standards Institute
- B. Building Code of the City of New York
- C. American National Standards Institute: ANSI A112.1.2. - Air Gaps in Plumbing System

- D. New York State Department of Environmental Protection

1.05 SUBMITTALS

- A. Shop Drawings:
1. Pipe and fittings.
 2. Drains.
 3. Cleanouts.
 4. Valves.
 5. Traps.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

- A. Floor Drains, Cleanouts, Plumbing Fixtures Supports:
1. J.R. Smith Manufacturing Co.
 2. Zurn Industries, Inc.
 3. Josam Manufacturing Co.
 4. Wade Division, Tyler Pipe & Foundry Co.
 5. Ancon.
 6. Proset Systems, Inc.

2.02 PIPING MATERIALS

- A. Cast Iron Waste, Drain, and Vent Pipe and Fittings
1. Cast iron waste, drain, and vent pipe and fittings shall be used for the following applications:
 - a. Pipe buried in or in contact with earth shall be extra heavy, uncoated
 - b. Interior waste and vent piping above grade.
 2. Cast iron pipe shall be bell and spigot or hubless (plain end or no-hub or hubless). Couplings: Type 304 stainless steel, neoprene gasket, four clamps (six for pipe size 5" and larger). Anaheim Foundry Company A Husky ® Series 4000 or approved equal.
 3. The material for all pipe and fittings shall be cast iron soil pipe and fittings and shall conform to the requirements of CISPI Standard 301, ASTM A-888, or ASTM A-74.
 4. Joints for hubless pipe and fittings shall conform to the manufacturer's installation instructions. Couplings for hubless joints shall conform to CISPI 310. Joints for hub and spigot pipe shall be installed with compression gaskets conforming to the requirements of ASTM Standard C-564 or be installed with lead and oakum.
- B. Copper Tube, [DWV]:
1. Copper DWV tube sanitary waste, drain and vent pipe may be used for piping above ground, except for urinal drains.
 2. The copper DWV tube shall be drainage type, drawn temper conforming to ASTM B306.
 3. The copper drainage fittings shall be cast copper or wrought copper conforming to ASME B16.23 or ASME 16.29.
 4. The joints shall be lead free, using a water flushable flux, and conforming to ASTM B32.
- C. Storm Piping:
1. Except as noted below: Cast iron hubless soil pipe and fittings, service weight, coated.
 2. Couplings: Type 304 Stainless Steel, Neoprene Gasket, Four Clamps (six for pipe size 5" and larger). Anaheim Foundry Company A Husky ® Series 4000 or approved equal.
- D. Sump, Sewage Ejector Discharge Piping and Fittings:
1. Galvanized steel pipe, standard weight with Victaulic Style 75 carbon steel drainage fittings.

2. On discharge of each sump and ejector pump provide, as per detail, one Victaulic series 318 Sump Ejector System including: 1 Vic S/365 plug valve, 1 Vic S/317 check valve, 2 Vic S/307 transition couplings, 1 Vic S/31 coupling.
 - E. Kitchen Sanitary Piping:
 1. Galvanized steel schedule 40 pipe with galvanized threaded cast iron drainage fittings.
 2. Provide drip pan below any sanitary piping hung in kitchen.
 - F. Chrome Plated Brass Piping:
 1. Exposed in rooms with fixtures and equipment in finished areas.
- 2.03 SPECIALTY PIPE FITTINGS**
- A. Transition pipe couplings shall join piping with small differences in outside diameters or different materials. End connections shall be of the same size and compatible with the pipes being joined. The transition coupling shall be elastomeric, sleeve type reducing or transition pattern and include shear and corrosion resistant metal, tension band and tightening mechanism on each end. The transition coupling sleeve coupling shall be of the following material:
 1. For cast iron soil pipes, the sleeve material shall be rubber conforming to ASTM C564.
 2. For dissimilar pipes, the sleeve material shall be PVC conforming to ASTM D5926, or other material compatible with the pipe materials being joined.
 - B. The dielectric fittings shall conform to ASSE 1079 with a pressure rating of 125 psig at a minimum temperature of 180°F. The end connection shall be solder joint copper alloy and threaded ferrous.
 - C. Dielectric flange insulating kits shall be of non conducting materials for field assembly of companion flanges with a pressure rating of 150 psig. The gasket shall be neoprene or phenolic. The bolt sleeves shall be phenolic or polyethylene. The washers shall be phenolic with steel backing washers.
 - D. The di-electric nipples shall be electroplated steel nipple complying with ASTM F 1545 with a pressure ratings of 300 psig at 225°F. The end connection shall be male threaded. The lining shall be inert and noncorrosive propylene.
- 2.04 DRAINS**
- A. Heavy cast iron, with double drainage flange and weep holes, with outlet connections as indicated and or sizes indicated on Drawings. Removable sediment basket shall be of heavy-duty one-piece construction as specified hereinafter. All strainers or grates shall be secured with vandalproof spanner type screws, unless otherwise specified.
 - B. In membrane waterproof floors or showers: Provide with 6 lb. lead flashing or 20 oz. soft rolled sheet copper and secured to the flashing flange with brass bolts and cast iron clamping device. Flashings shall bond not less than 1'-0" on all sides into membrane waterproofing.
 - C. On roofs, furnish and set, in conjunction with the roofer, and when directed by the General Construction Contractor, approved roof drains of cast iron unless otherwise indicated.
 - D. Flashing of 6 lb. lead or 20 oz. soft rolled sheet copper 34" x 34" shall be furnished and installed at each roof drain by means of non-puncturing type flashing clamping device.
 - E. Set all drains in such a way that the floor finish and top of the drain will be plumb and flush with finish floor without requirements for future additional extension, modifications, etc.
 - F. When Dex-O-Tex and/or vinyl waterproof floor is indicated on the Architectural Drawings, all drains must be provided with required flanges.
 - G. All drains, except as noted, shall J.R. Smith Mfg. Co. or approved equal and shall be as follows:
- 2.05 FLOOR DRAINS**
- A. Conforming to ANSI A112.21.1

- B. Coated cast iron body.
- C. Integrated double drainage flange and weep holes.
- D. No-hub outlet.
 - 1. Type "A" (Toilet Rooms and Shower Drains): Smith #2005-A, with nickel bronze 5" round top in toilets, 6" top in showers.
 - 2. Type "B" (Mechanical Rooms): similar to Type "A" with bottom bar grate. Smith #2320.
- E. Removable secondary strainer:
 - 1. Floor Drains Type A (Kitchen, Finished Areas, Toilet Rooms):
 - a. J.R. Smith 2005-A, 5" diameter with flashing collar, nickel bronze top.
 - 2. Floor Drains Type B (Mechanical Equipment Rooms):
 - a. J.R. Smith 2320 flashing collar with cast iron tractor grate and flat bottom strainer. Provide cast iron funnel attached to grate, where noted.
 - 3. Floor Sink Type G:
 - a. Porcelain enameled, with dome strainer, flashing flange and grate.
 - b. J.R. Smith 3440.
 - 4. Area Drains Type H:
 - a. Bottom outlet, non-puncturing clamp device, extension, non-tilting grate with minimum free drainage area of 27 sq. inches. Drains in finished areas: Polished nickel bronze top and grate.
 - b. J.R. Smith 1450.
 - 5. Drain in Trenches Type I:
 - a. Bottom outlet with dome strainer.
 - b. J.R. Smith 1330.

2.06 ROOF DRAINS

- A. Conforming to ANSI A112.21.2
- B. Coated cast iron body with inside caulk bottom outlets except as noted.
- C. Type A:
 - 1. Roof Drains R.D. Type A:
 - a. Coated cast iron body with combination flashing collar and gravel stop, cast iron dome, underdeck clamp and sump receiver and perforated extension collar to accommodate roof insulation. Drain must be applicable for each construction.
- D. Type B:
 - 1. Flat top grate.
 - 2. Extension collar of required height.
 - 3. Deck clamp.
 - 4. Sump receiver.
 - 5. Similar to J.R. Smith Fig. 1410-ERC-NB, with nickel bronze top.
- E. Type "B": 2" or 3" outlet, satin chrome finish, side outlet. Smith figure 1670T.
- F. Type "A" J.R. Smith fig. 1010-ERC with combination flashing collar and gravel stop, cast iron dome, underdeck clamp and sump receiver and extension collar to accommodate roof insulation.
- G. Type "B": 8" square heel proof nickel bronze top, perforated standpipe with stainless steel mesh, Smith Fig. SQ-1-3095-SSM-NB-HP.
- H. Type "C": Smith fig. 1479-RC-NB-HP with 8" square heel proof nickel bronze top, underdeck clamp and sump receiver.
- I. Type "D": 8 1/2" low profile dome, sump receiver and underdeck clamp. Smith Fig. 1330-RC.

- J. Type "E": Similar to type "B" except with 8 1/2" diameter dome. Smith Fig. SQ-1-3051-SSM.
- K. Type "D": Planter Drain #1. Smith fig 2675 with duco cast iron body and flashing clamp with cast iron dome and stainless steel mesh screen.
- L. Type "E": Planter Drain #2. Smith fig 2685-SSP with duco cast iron body with bronze extended standpipe covered in stainless steel mesh. Extension to accommodate entire depth of planter.
- M. Type "F": Scupper type, 90 degree threaded outlet, and flush, secured grate. Smith Fig. 1520T-SG.
- N. Install per architectural and plumbing details.
- O. Trench Drains: Fiberglass, galvanized steel frame, less grate 4" side or bottom outlet as indicated on drawings. Smith ACO No. 9810. Provide Smith No. 9854 strainer.
- P. Install per architectural and plumbing details.

2.07 CLEANOUTS

- A. Conforming to ANSI A112.36.2.
- B. Cast iron with bronze plug, full size up to 4" and at least half size for larger pipes with 4" minimum.
- C. Provide easily accessible cleanouts where indicated to make entire drainage system accessible for rodding. Provide at least 18 inch clearance to permit access to cleanout plugs.
- D. Cleanouts for cast iron pipe shall consist of tapped extra heavy cast iron ferrule caulked into cast iron fittings, and extra heavy brass screw plug with solid hexagonal nut.
- E. Cleanouts turning out through walls and up through floors shall be made by long sweep ells of "Y" and 1/8" bends with plugs and face or deck plates to conform to architectural finish in room. Where no definite finish is indicated on the Architectural and/or Mechanical Drawings, wall plates shall be chrome plates cast brass and floor plates shall be nickel bronze. Screws in cleanouts in finished areas shall be vandalproof.
- F. The following schedule indicates the various types of cleanouts required at various locations indicated on the Drawings. Cleanouts shall be J.R. Smith Mfg. Co. or approved equal. The characteristics and quality of the cleanout shall be as follows:
 - 1. Cleanout fitting in vertical stacks shall consist of tapped tees, capable of receiving a rough brass raised head cleanout plug.
 - a. J.R. Smith 4530 series.
 - 2. Cleanouts in Mechanical Equipment Rooms:
 - a. J.R. Smith 4220 series.
 - 3. Cleanouts in finished areas. With recess for tile floors:
 - a. J.R. Smith 4140 or 4020 series.
 - 4. Cleanouts in Dex-O-Tex waterproof floors:
 - a. J.R. Smith DX4343.
 - 5. Cleanouts for 3 or more fixtures piped horizontally shall be extended to wall cleanouts.
 - a. J.R. Smith 4452 or 4472 or 4402.
- G. All cleanout plugs shall be brass and lubricated with graphite before installation.

2.08 TRAPS

- A. Each fixture and piece of equipment requiring connection to the drainage system shall be separately trapped by means of a water seal trap placed as close to the fixture as possible.

- B. All running traps shall have inlet handhole cleanouts and brass plug cleanouts in bottom. Cast iron traps in ground: omit bottom plug. All exposed P traps shall have bottom cleanouts and be chromium plated cast brass.

2.09 STACK SLEEVES

- A. For pipes through roof with cast iron body. The space between the flashing sleeve and the pipe passing through the same shall be caulked watertight with lead.
 - 1. J.R. Smith 1740C (caulked).
 - 2. J.R. Smith 1750 (threaded).
 - 3. Josam Manufacturing
 - 4. Zurn Industries

2.10 FLASHING FITTINGS

- A. Provide vents and pipes through roofs with flashing fitting set at suitable level to terminate the flashing. Locate minimum of 12 inches from walls or other obstructions to permit proper flashing.
 - 1. J.R. Smith 1760.

2.11 FRESH AIR INLETS

- A. Exposed type:
 - 1. Gooseneck type, cast iron.
 - 2. Locate and size as shown on drawings.
- B. Flush type:
 - 1. Perforated bronze plate with pipe clamp, finish as specified by Commissioner.
 - 2. R. Smith Fig. No. 9005, size as noted.

2.12 FLASHING FITTINGS

- A. Provide vents and all other pipes passing through roofs with a flashing fitting set a suitable level above the roof to terminate the flashing. Arrange piping passing through roofs to be a minimum of 12 inches from walls or other obstructions so as to permit proper flashing.

2.13 PIPELINE AIR GAPS

- A. Pipeline air gaps must assure against back-siphonage by overflowing. Units shall be installed in water makeup lines to vessels under atmospheric pressure only. Air gap of unit must be at least twice the pipe diameter of the pipe in which it is installed.

2.14 THRUST BLOCKS

- A. This Work shall cover the installation of concrete thrust blocks as shown on the plans or as required.
- B. Thrust blocks shall be composed of concrete aggregated meeting ASTM Specification C-33 and Portland Cement meeting ASTM Specification C-150 Portland Cement or C-175 for Air Entrained Portland Cement. Mix shall not be leaner than 1 cement, 2-1/2 sand, 5 stone, having a compressive strength of not less than 2000 psi in 36 hours when using high early cement and 7 days when using standard cement.
- C. Thrust blocks shall be applied or ordered at bends, tees and hydrants where changes in pipe diameter occur at reducers in fittings.
- D. Thrust blocks shall be placed between solid ground and the fittings to be anchored. The area of bearing on fitting and on ground in each instance shall be that required by the Commissioner. The concrete shall be placed so that the pipe and fitting joints will be accessible for repair unless

otherwise directed by the Commissioner. Install one (1) layer of tar on all surfaces that will come in contact with concrete pour.

2.15 TIE-RODS

- A. Provide tie-rods for the site water main.
- B. Tie-rods shall comply with NFPA, Chapter 24, Appendix A Specification and pipe manufacturer's recommendations.
- C. Special consideration shall be given at the service entrance to the building. Provide auxiliary ties to the foundation wall, to equalize building and pipe movement.

PART 3.00 - EXECUTION

3.01 PIPE INSTALLATION

- A. The pipe installation shall comply with the requirements of these specifications and the code requirements of the New York City Building Code.
- B. Branch piping shall be installed for waste from the respective piping systems and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by New York City or specified in other sections.
- C. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe shall be reamed to full size after cutting.
- D. All pipe runs shall be laid out to avoid interference with other work.
- E. The piping shall be installed above accessible ceilings where possible.
- F. The piping shall be installed to permit valve servicing or operation.
- G. Unless specifically indicated on the drawings, the minimum slope shall be 2% slope.
- H. The piping shall be installed free of sags and bends.
- I. Seismic restraint shall be installed where required by code.
- J. Changes in direction for soil and waste drainage and vent piping shall be made using appropriate branches, bends and long sweep bends. Sanitary tees and short sweep quarter bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Long turn double wye branch and eighth bend fittings shall be used if two 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. Proper size of standard increaser and reducers shall be used if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- K. Buried soil and waste drainage and vent piping shall be laid beginning at the low point of each system. Piping shall be installed true to grades and alignment indicated with unbroken continuity of invert. Hub ends shall be placed upstream. Required gaskets shall be installed according to manufacturer's written instruction for use of lubricants, cements, and other installation requirements.
- L. Cast iron piping shall be installed according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings"
- M. Aboveground copper tubing shall be installed according to CDA's "Copper Tube Handbook".
- N. Slope horizontal drainage piping 3" and smaller, 1/4" per foot where possible, but minimum 1/8" per foot with minimum computed velocity 2 fps.

- O. Slope horizontal drainage piping 4" and larger, 1/8" per foot except as noted.
- P. Provide hanger support at starting end of all drainage lines which turn from vertical to horizontal.
- Q. Changes in direction of drainage piping by use of:
 - 1. 45 wyes.
 - 2. Long turn tee wyes.
 - 3. Long sweep quarter bends.
 - 4. Sixth, eighth or sixteenth bends.
- R. Slip Joints: On fixture trap inlets or elbows connecting to fixture tailpieces only.
- S. Vent Piping: Grade to drain out condensation and connect at base to prevent accumulation of rust.
- T. Locate cleanouts as follows:
 - 1. Approximately every 50 feet on horizontal drainage piping.
 - 2. Changes in direction.

3.02 JOINT CONSTRUCTION

- A. Hub and spigot, cast iron piping with gasket joints shall be joined in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Hub and spigot, cast iron piping with calked joints shall be joined in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
- C. Hubless or No-hub, cast iron piping shall be joined in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless piping coupling joints.
- D. For threaded joints, thread pipe with tapered pipe threads according to ASME B1.20.1. The threads shall be cut full and clean using sharp disc cutters. Threaded pipe ends shall be reamed to remove burrs and restored to full pipe inside diameter. Pipe fittings and valves shall be joined as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is required by the pipe service
 - 2. Pipe sections with damaged threads shall be replaced with new sections of pipe.
- E. Copper tube and fittings with soldered joints shall be joined according to ASTM B828. A water flushable, lead free flux conforming to ASTM B813 and a lead free alloy solder conforming to ASTM B32 shall be used.

3.03 SPECIALTY PIPE FITTINGS

- A. Transition coupling shall be installed at pipe joints with small differences in pipe outside diameters.
- B. Dielectric fittings shall be installed at connections of dissimilar metal piping and tubing.

END OF SECTION

SECTION 22 3000 - PLUMBING EQUIPMENT, SPECIALTIES & ACCESSORIES

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide Equipment, Specialties and Accessories as shown on the drawings and as specified herein.

1.03 RELATED WORK

- A. Common Work Results for Plumbing -Section 22 0511
- B. Sanitary, Waste, and Storm Systems -Section 22 1300
- C. Water Distribution Piping -Section 22 0523
- D. General Duty Valves -Section 23 1000
- E. Plumbing Tests -Section 22 0513
- F. Plumbing Insulation -Section 22 0711

1.04 QUALITY ASSURANCE

- A. A.N.S.I. -American National Standards Institute
- B. A.W.W.A. -American Water Works Association
- C. F.S. -Federal Specifications
- D. N.F.P.A. -National Fire Protection Association
- E. A.G.A. -American Gas Association
- F. C.G.A. -Compressed Gas Association
- G. U.L. -Underwriters Laboratory
- H. Plumbing Code

1.05 SUBMITTALS

- A. Make submittals on all items listed above in Section 1.02, Work Included.
- B. Shop drawings indicating size, location, details and installation requirements.
- C. Product Data: Manufacturers' printed data, catalog cuts, test data, performance curves, manufacturer's recommendations.
- D. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring for HVAC equipments. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- E. Operational and Maintenance Manuals: Manufacturer's instructions for operation and maintenance.

PART 2.00 – PRODUCTS

2.01 MANUFACTURERS

- A. Domestic Water Heater/Storage Tank: (Large)
 - 1. PVI
 - 2. A.O. Smith
 - 3. Patterson-Kelley
- B. Pressure Booster Systems:
 - 1. Syncro-Flo Inc.
 - 2. Aurora-Pentair
 - 3. QuantumFlo Inc..
- C. Recirculation Pump:
 - 1. Bell & Gossett
 - 2. TACO
 - 3. Thrush
 - 4. Grundfos Alpha Magna
- D. Heat Exchangers:
 - 1. Bell & Gossett
 - 2. Patterson-Kelley
- E. Sump Pumps and Sewage Ejectors:
 - 1. Flygt Pump.
 - 2. Peerless Pump Co.
 - 3. Federal Pump Co.
 - 4. Stancor
 - 5. Weil Pump Co.

2.02 DOMESTIC WATER BOOSTER PUMP SYSTEM

- A. Provide factory-built and factory-tested packaged domestic water booster pump systems as indicated, of sizes, configuration, and capacities as scheduled, and as specified herein. Units shall consist of pumps, copper headers, variable speed drives, and controller. The entire system shall be listed under UL 2011, 38LW, "Packaged Pumping System" requirements.
- B. Complete package system:

1. Pump manufacturer: Responsible for completeness of system including pumps, motors, controls, and controller and operation of system, including:
 - a. Detailed piping connection drawings and wiring diagrams.
 - b. Factory tested through complete range of operation.
 - c. Supervise final adjustment of controls, place system in operation and instruct Owner's operator for one day.
 2. Complete package on common support:
 - a. Piping and valves shall comply with specification on piping and valves for domestic water.
 - b. Provide base with vibration isolators as detailed.
- C. Pumps
1. Multi-stage centrifugal type.
 2. Butterfly suction and discharge valves.
 3. Stainless steel shaft sleeve, impeller, diffuser chamber and seal rings.
 4. Mechanical seal assembly with tungsten carbide faces.
 5. 2 heavy duty grease lubricated ball radial and thrust bearings in cast iron pedestal housing support pump.
 6. ANSI flanged connections.
 7. Cast iron suction/discharge chamber.
 8. Non-overloading characteristic so as not to exceed nominal rating of motor at any point on curve.
- D. Motors:
1. NEMA Premium, TEFC, continuous duty type.
 2. Vertically mounted with grease lubricated ball bearings.
 3. Hollow shaft type allowing axial adjustment of impellers.
 4. Wound for noted controller.
- E. Mounting:
1. Connected with flexible coupling.
 2. Aligned, bolted and doweled in place on heavy steel channel base or extended type cast iron bed plate with drainage lip, by manufacturer. Provide coupling guard.
- F. Provide automatic No Flow device to stop lead pump and start pump again at pressure drop, complete with pressure switch.
- G. Provide adjustable thermal detector within each pump casing to, at predetermined temperature, purge pump of hot water through relay and purge valve.
1. Purge valves: 1/2 inch threaded IBBM solenoid valve with self closing control (120 volt, single phase).
- H. Flow switch: Rotometer type with visible etched glass gauge for indicating flow, and compensating stainless steel orifice.
- I. Variable Frequency Drives:
1. Each pump shall have its own variable frequency drive with the following features: The drive shall be a voltage source, GTR or IGBT power transistor based inverter-PWM Type. The inverter shall use a high carrier frequency to reduce drive and motor noise.
 - a. Drive shall be capable of operating in an ambient temperature between 15°F and 100°F and a line voltage variation of less than 10%.
 - b. Self protection features shall include: under voltage and over voltage protection, current overload protection, short circuit protection, power failure protection, ground fault protection, and over-temperature protection.
 - c. A four digit LED readout shall be provided to indicate the following: drive enabled, output frequency, and all VFD fault conditions.
 - d. The drive shall be capable of automatically restarting after any of the following: overload over-voltage, converter over-current, inverter over-current, or power failure.
 - e. The following drive parameters shall be user adjustable: acceleration speed (1 to 300 seconds), deceleration speed (1 to 300 seconds), minimum speed, and maximum speed.

- f. The drive shall have a front mounted "HAND-OFF-AUTO" selector switch and a potentiometer for adjusting drive speed in the "HAND" position.
- J. System Operation:
- 1. Automatically maintain constant system pressure plus or minus 2 psi at discharge of main control valve regardless of system flow demands between zero and maximum flow.
 - 2. Automatic electrical alternation of lag pumps.
 - 3. Upon drop in system flow, lag pumps shall be stopped in reverse order of starting.
 - 4. Maintain system pressure at uniform constant pressure from varying higher discharge pressures with Variable Frequency Drives.
 - a. Valves: Threaded or flanged cast iron body with stainless steel trim, adjustable hydraulically operated bronze (stainless steel mounted) pilot controlled spring diaphragm type, 250 psi wsp.
 - b. Adjustment range 30-300 psi.
 - c. Main valve with flow control.
- K. Pressure Sensor/Transmitter:
- 1. A digital pressure transmitter shall be connected system header. The transmitter shall have 1.0% accuracy, stainless steel wetted parts and a waterproof enclosure.
 - 2. Transmitter shall be capable of withstanding over pressurization of double its range. Transmitter shall have independent zero and span adjustments.
- L. Sequence of Operation:
- 1. The control system shall start, stop and vary the speed of the pumps as required by system demand. The controller shall sequence pumps based on pressure readings from a pressure transducer and flow readings from an insertion type paddlewheel flow sensor. As a backup, a factory set pressure switch shall sequence pumps when system pressure falls below the setpoint. Should the system demand exceed the capacity of the lead pump or should the lead pump fail to operate, the lag pumps shall be started, in sequence. Upon drop in system flow, the pumps shall be stopped in reverse order. In the event of an abnormally low suction condition, the system shall shutdown and activate the alarm. Automatic sequencing shall include the following features: sequence shifting that adjusts the pump sequence when any pump is disabled, successive and 24 hour alternation of equal capacity pumps with pump overlap, lag pump exerciser function, special sequencing to reduce surges during power restoration, sequential sequencing of lag pumps, minimum run and stop delay timer for each pump, and field adjustable time delay for lag pump pressure start signals.
- M. Control Panel:
- 1. Furnish a controller in a NEMA-1 enclosure with individual through the door circuit breaker disconnect switches and variable frequency drives for each pump. The controller shall include a 120 volt fused control circuit transformer, automatic 24 hour alternation circuit, programmable logic controller having non-volatile EEPROM memory, operator interface, digital flow meter with totalization and multiple position selector switch. Include the following:
 - 2. Combination unfused disconnect switch.
 - a. Overload protection for each phase leg.
 - b. Under voltage release.
 - 3. 120 volt control circuit transformer with fuse in secondary and automatic transfer switch on primary.
 - 4. Heavy duty HOA selector switches.
 - 5. 4 PDT transfer switch.
 - 6. Automatic electric alternator.
 - 7. Flow switch with indicating lights.
 - 8. Pressure switches.
 - 9. Necessary relays.
 - 10. Low suction pressure cutoff with automatic reset.
 - 11. Pneumatic timers.
 - 12. Test buttons.
 - 13. Emergency start circuit on loss of pressure of lead pump.

14. Contact for remote low system pressure alarm.
 15. Pump running and alarm lights.
 16. 4-1/2 diameter suction, discharge and system gauges.
 17. Mounted and pre-wired in single NEMA-1 enclosure.
 18. All gauges and pilot lights: visibly mounted.
 19. System interface shall be 4.5", 256 color touch screen HMI interface providing all system data such as pressure, pump speed, amperage, run-time per pump, system temperature and timing functions without the need to open the panel door.
 20. All control wires shall be individually numbered, and each component shall be labeled accordingly. All internal wiring shall be copper stranded, A.W.G. with a minimum insulation of 90°C. The complete assembly shall have the UL-508 listing mark for industrial control panels.
- N. Provide 1/4" in. gauge piping, complete with brass gauge cocks from control panel to suction header, discharge and discharge of each pump.
- O. Quality Assurance:
1. All equipment under this section shall be furnished by a single supplier having sole responsibility for proper functioning of the system. The equipment shall be products that the manufacturer has regularly produced for a minimum of ten (10) years. The manufacturer shall have on staff a registered professional engineer (PE) and degreed mechanical and electrical engineers.
 2. The booster system manufacturer shall comply with OSHA and Federal Regulation 29 CFR 1910.399 requiring complete system certification by an NRTL (Nationally Recognized Testing Laboratory (Independent Third Party)). The system shall be certified by ETL under sections 219.225 & 281 and also be UL Listed under 9F35.
- P. Factory Test and Certification:
1. The booster system and its component parts shall undergo a hydrostatic pressure and complete operating flow test from zero to 100% design flow rate under the specified suction and net system pressure conditions. The testing shall comply with ANSI/SAE J745-APR87 Hydraulic Power Sump Test Procedures. The testing shall also include a hi-pot voltage test of the system. The final system certification shall include copies of the ETL and UL Certifications and test data as recorded by X-Y plotter. The specifying Engineer shall have the option to witness the test. The entire system shall be painted after testing.
- Q. Start-Up & Warranty
1. The Pump Manufacturer's Representative shall have single source responsibility for the pumps and complete control system. Start-up services including pump alignment, adjustment and field calibration of controls, operator instruction and system warranty shall be included in the price for the system. The warranty shall be 12 months from date of start-up..
- R. Installation & Field Piping
- Install the system adjacent to a floor drain to prevent building damage in the event of pump mechanical seal failure. The contractor shall interconnect the tank and system, as described above and shall pipe the discharge of the over temperature purge valves to the floor drain. The contractor shall install a full sized bypass around the pump system with check and isolation valves.

2.03 ELEVATOR SIMPLEX SUMP PUMP

- A. Provide factory-built and factory-tested sump pump as indicated, of sizes, configuration, and capacities as scheduled, and as specified herein. Simplex, automatic with float switch, high water and oil alarms, bronze impeller, stainless steel shaft.
- B. 10 gpm, 19 hp, 3600 rpm, 0.4 hp. 115 volt, 1 phase, 10 ft. cord with plug.
- C. Stancor Oil-Minder SE40 with Oil-Minder controller.

2.04 DUPLEX SEWAGE EJECTORS (SUBMERSIBLE TYPE)

- A. Provide factory-built and factory-tested sewage ejectors as indicated, of sizes, configuration, and capacities as scheduled, and as specified herein.
- B. General:
 - 1. Non-overloading characteristics so as not to exceed nominal rating of motor at any point on curve.
 - 2. Pumps capable of macerating sewage solids and fibrous wastes into a fine slurry and designed to pump air and liquid in combination without becoming air bound.
 - 3. Mechanical Seal: Independent, tandem, double mechanical pressure compensating seals, running in an oil reservoir. Seals composed of two separate tungsten-carbide lapped face rings. Lower compression spring protected against exposure to sewage.
 - 4. Galvanized lifting chain and guide rails.
- C. Pump:
 - 1. Automatic non-clog submersible cutter type, cast iron casing, bronze, non-clog type impeller.
 - 2. Discharge: galvanized steel flanged.
 - 3. Provide automatic flush valve device on one pump: cast iron body, polyurethane ball, and adjustable flush time. Flygt 4901.
- D. Motor: squirrel cage induction type, grease lubricated ball bearings, drip cover, vertically mounted.
- E. Control:
 - 1. Magnetic inductance type:
 - a. Flygt "Multitrode".
 - b. Level sensor: Solid multi-sensored probe type liquid level sensor for duplex pump operation, high and low water level alarms. Premium quality uPVC extruded tube with stainless steel sensors epoxy encapsulated in a rigid unit and suitable for up to 212° F, suspended by a single multicolored cable from a stainless steel combination mounting bracket and cleaning squeegee by a stainless steel hook. One differential level sensor installed as a redundant level control device.
 - c. Control module: Liquid level display, set point adjustment, automatic alternator with manual override.
 - 2. Automatic sump cleaning controller: 24 VAC power supply, electronic control, relay output, LED displays for power, current, pump relay and cleaning. Flygt APF-Cleaner. Provide all interconnections with control panel and set cleaning cycle to once per 24 hour period.
- F. Controller:
 - 1. Combination unfused disconnect switch and across-the-line magnetic starter.
 - a. Overload protection for each phase leg.
 - b. Undervoltage release.
 - c. Pump running lights.
 - d. Elapsed time meter.
 - e. One main power feed. Two main power feeds.
 - 2. 24 volt control circuit transformer
 - 3. HOA selector switch.
 - 4. Alarm with silencing push-button and auxiliary contacts for remote trouble alarm.
 - a. Alarm conditions:
 - 1. High water level.
 - 2. Low water level.
 - 3. Pump failure.
 - 4. 2-pump over temperature.
 - 5. 2-motor insulation fault.
 - 5. Prewired in single NEMA-I enclosure of steel construction.
- G. Basin:
 - 1. Cast iron with anchor ridge and 1" thick top flange. Size as noted on drawings. Install in accordance with manufacturers recommendations.

2. Cover: 1/4" thick epoxy coated checkered steel gasketed with openings for:
 - a. Pumps.
 - b. Controls.
 - c. Alarm tube.
 - d. Vent.
 - e. 14" x 20" gasketed access manhole cover.
 3. Install top of cover flush with finished floor with suitable frame of galvanized steel with welded stops and lugs for anchoring into concrete.
- H. Pit:
1. Reinforced waterproof concrete. Size as noted on drawings.
 2. Cover: 3/4" thick epoxy coated checkered steel gasketed with openings for:
 - a. Pumps.
 - b. Controls.
 - c. Alarm tube.
 - d. Vent.
 - e. 14" x 20" gasketed access manhole cover.
 3. Install top of cover flush with finished floor with suitable frame of galvanized steel with welded stops and lugs for anchoring into concrete.

2.05 DOMESTIC WATER HEATERS—GAS FIRED

- A. Provide a factory built fire tube, storage-type domestic hot heater capable of firing natural gas. Mount unit on heavy steel base frame, complete with trim, and insulation. The water heater shall bear the ASME "H" stamp and shall be National Board registered for 160 psi working pressure. The entire water heater shall be listed by Underwriters Laboratories.
- B. The storage and heating sections shall be completely factory packaged on a single skid, requiring only job site hookup to utilities, venting, and plumbing. The heater shall be insulated to ASHRAE 90.1-2010 requirements, jacketed with enameled steel panels, and mounted on heavy-duty channel skids. The heater shall fit properly in the space provided and installation shall conform to all local, state, and national codes. The water heaters shall be ETL listed as a complete unit. The heater shall satisfy current Federal Energy Policy Act standards for both thermal efficiency and stand-by heat losses as established for gas fired water heaters incorporating storage tanks.
- C. Service Access: The water heater shall be provided with access covers for easily accessing all serviceable components. All gas train components must be accessible and able to adjust without the removal of cabinet components.
- D. The storage section of the water heater shall be ASME HLW stamped and National Board Registered for a maximum allowable working pressure of 150 psi and pressure tested at 1-1/2 times working pressure.
- E. All tank connections/ fittings shall be nonferrous. Tank shall be equipped with a ball-type drain valve. Tank design will include a manway sized access to the tank interior.
- F. The storage tank shall be an unlined pressure vessel constructed from phase-balanced austenitic and ferritic duplex steel with a chemical structure containing a minimum of 21% chromium to prevent corrosion and mill certified per ASTM A 923 Methods A to ensure that the product is free of detrimental chemical precipitation that affects corrosion resistance. The material selected shall be tested and certified to pass stress chloride cracking test protocols as defined in ISO 3651-2 and ASTM G123 - 00(2005) "Standard Test Method for Evaluating Stress-Corrosion Cracking of Stainless Alloys with Different Nickel Content in Boiling Acidified Sodium Chloride Solution."
- G. Waterside surfaces shall be welded internally utilizing joint designs to minimize volume of weld deposit and heat input. All heat affected zones (HAZ) shall be processed after welding to ensure the HAZ corrosion resistance is consistent with the mill condition base metal chemical composition. Weld procedures (amperage, volts, welding speed, filler metals and shielding gases) utilized shall result in a

narrow range of austenite-ferrite microstructure content consistent with phase balanced objectives for welds, HAZ and the base metal.

- H. All internal and external tank surfaces shall undergo full immersion passivation and pickling processing to meet critical temperature, duration and chemical concentration controls required to complete corrosion resistance restoration of pressure vessel surfaces. Other passivation and pickling methods are not accepted. Immersion passivation and pickling certification documents are required and shall be provided with each product.
- I. Materials shall meet ASME Section II material requirements and be accepted by NSF 61 for municipal potable water systems. Storage tank materials shall contain more than 80% post-consumer recycled materials and be 100% recyclable.
- J. Water contacting tank surfaces will be non-porous and exhibit 0% water absorption. Lined or plated storage tanks will not be acceptable.
- K. The water heater will not require anode rods and none will be used. Tanks that employ anodes will not be acceptable.
- L. The heat exchanger shall be a two-pass, fire tube design with the combustion chamber and all heating surfaces completely water-backed.
- M. The fireside of the combustion chamber shall be of boiler-grade steel. The waterside of the combustion chamber shall be non-ferrous composite of copper arc spray sealed with PTFE. The fire tubes shall be solid copper. The heat exchanger shall be field removable from the pressure vessel, allowing 100% access to waterside surfaces.
- N. Combustion will be provided by a fan-assisted burner with a gas train meeting UL and FM requirements for the input specified.
- O. When tested to the ANSI Z21.10.3 thermal efficiency standard, result shall be no less than 83%. Water heater will meet the thermal efficiency and standby loss requirements of ASHRAE 90.1 2010.
- P. As a minimum, the heater will be equipped with the following:
 - 1. Electronic flame monitoring
 - 2. An immersion operating thermostat
 - 3. An immersion temperature limiting device
 - 4. ASME- or AGA-rated temperature and pressure relief valve
- Q. Operating and safety controls shall meet the requirements of UL 795 and FM
- R. Start up of the unit shall be performed by factory-trained and authorized personnel. A copy of the start-up report shall be provided to the Owner.

2.06 DOMESTIC HOT WATER STORAGE TANKS—FACTORY ASSEMBLED

- A. Provide domestic hot water storage tanks as shown on drawings. The pressure vessel shall be factory assembled in the field and mounted on structural supports and be suitably insulated, and jacketed. Piping connections shall be provided as specified.
- B. The pressure vessel shall be all welded construction and ASME Code Section VIII stamped for a working pressure of 250 psig. The storage vessel shall be carbon steel and lined with seamless Hydrastone cement to a minimum thickness of 5/8" on 100% of all interior tank surfaces. The pressure vessel is to be completely covered with 2" thick "E" type energy conservation fiberglass blanket insulation and enclosed in a heavy gauge galvanized steel metal jacket finished in gray hammertone enamel. The vessel shall be protected by an ASME approved automatic reseating combination temperature and pressure relief valve set at the tank WP and 210°F.
- C. Each tank shall be factory packaged with the following components:
 - 1. Domestic water dial temperature and pressure gauge shall be factory installed.

- D. The water tank manufacturer shall warranty all components against defects in Workmanship and material for a period of one (1) year from date of start-up and the pressure vessel for a full ten (10) years.
 - E. Water tank shall be manufactured PVI, A.O. Smith, Hubbell or approved equal.
- 2.07 **DOMESTIC HOT WATER COMPRESSION TANKS**
- A. A steel pressure rated tank constructed with welded joints and factory installed butyl rubber diaphragm shall be installed as scheduled. The air pre charge shall be set to minimum system operating pressure at tank.
 - B. The tappings shall be factory fabricated steel, welded to the tank and include ASME B1.20.1 pipe thread.
 - C. The interior finish shall comply with NSF 61 barrier materials for potable water tank linings and the liner shall extend into and through the tank fittings and outlets.
 - D. The air charging valve shall be factory installed.
 - E. Tank shall be manufactured by Bell and Gossett, Amtrol, or approved equal.
- 2.08 **COMBINATION TEMPERATURE AND PRESSURE RELIEF VALVES**
- A. The combination temperature and pressure relief valves shall be ASME rated and stamped and include a relieving capacity at least as great as the heat input and include a pressure setting less than the water heater's working pressure rating.
- 2.09 **HOT WATER RE-CIRCULATION PUMP**
- A. In-line type, Bronze body, Brass impeller.
 - B. Capacities and model as noted on drawings.
 - C. For pumps ½ hp and higher: Provide pump, a combination circuit breaker and magnetic across-the-line motor started with hand off automatic switch all mounted in a safety cabinet.
 - D. For pumps less than ½ hp: Provide motor starters with proper size thermal overload and pilot light.
 - E. Provide 24-hour, repeating, adjustable timer mounted in the safety cabinet specified above. Select pump will run continuously or as selected by Timer.
 - F. Pump shall be manufactured by Bell and Gossett, Taco, or approved equal.
- 2.10 **VIBRATION ISOLATION**
- A. Base Named Manufacturer – Consolidated Kinetics
 - B. All mechanical equipment over 1 horsepower unless otherwise noted, shall be isolated from the structure by means of resilient vibrator and noise isolators. Mounts and bases shall be as listed in the equipment schedule, and as described herein.
 - (1) "N" Mounts – Type RD neoprene mounts, incorporating completely enclosed metal inserts to permit bolting to the supported unit.
 - (2) "F" Mounts – Type KIP-Q precompressed molded fiberglass isolation pads, neoprene-jacketed and stabilized during manufacture.
 - (3) "S" Mounts – Type FDS freestanding, unhouse stable spring mounts, incorporating leveling bolts, and 1/4" thick neoprene-jacketed precompressed molded fiberglass noise isolation pads.

- (4) "L" Mounts – Type FRS freestanding, unboxed stable spring mounts, similar to type FDS, except incorporating vertical limit stops.
- (5) "H" Hangers – Type SFH combination spring and fiberglass hangers, incorporating 2" thick neoprene-jacketed precompressed molded fiberglass inserts in series with springs, all encased in welded steel brackets.
- (6) "B" Bases – Type SRB or SBB structural steel rail or beam bases, designed and supplied by the isolator manufacturer.
- (7) "I" Bases – Type CIB reinforced concrete inertia bases, the steel members of which are designed and supplied by the isolator manufacturer. The concrete shall be poured into a welded steel channel frame, incorporating prelocated equipment anchor bolts and pipe sleeves, welded-in 1/2" diameter reinforcing bars of 8" centers each way, and isolator brackets to reduce the mounting height of the equipment.
- (8) Installation shall be in accordance with manufacturer's instructions.
Other Acceptable manufacturers – Mason Industries, Korfund

2.11 FLEXIBLE CONNECTORS

- A. Furnish and install flexible connectors at all pipe connections to rotating or reciprocating equipment.
- B. Flexible connectors shall be manufactured by Keflex Inc.
- C. Twin, sphere, floating flange type.
- D. Characteristics shall be as follows:

(O.A.) Pipe Size	Length	(@ 70°F) Max. W.P.	(Inches) End Max. Offset	Conn.
3/4"	11"	675	0.50"	MPT
1"	12"	550	0.25"	MPT
1- 1/4"	13"	510	0.50"	MPT
1- 1/2"	14"	450	0.50"	MPT
2"	15"	435	0.50"	FLG
2- 1/2"	16"	350	0.25"	FLG
3"	17"	325	0.25"	FLG
4"	19"	270	0.50"	FLG
5"	20"	200	0.50"	FLG
6"	21"	185	0.50"	FLG

- E. Flexible connectors shall be braided stainless steel annular close pitch hose with stainless steel braid. M.P.T. ends shall be carbon steel. Flange ends shall be 150 lb. rated conforming to ANSI B16.5.

2.12 HEAT TRACING

- A. UL listed, self-regulating, 208V single phase.
- B. Raychem XL-Trace 5XL2-CR with required accessories.
- C. 16 AWG copper bus, 5 Watts per foot.
- D. For water piping subject to freezing

PART 3.00 – EXECUTION

3.01 GENERAL REQUIREMENTS FOR ALL PLUMBING EQUIPMENT

- A. Examination
 - 1. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 2. Examine roughing-in for ductwork, piping, and electrical connections to verify actual locations before installation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Installation
 - 1. Secure all equipment to building structure and install equipment in accordance with approved detail drawings, manufacturer's instructions, and all codes and regulations which apply.
 - 2. Install all accessories not factory installed.
 - 3. Install equipment level and plumb unless otherwise noted.
 - 4. Install equipment with required access and clearances. If there are field condition that prevent providing access and clearances notify the Commissioner. If the equipment is installed before rectifying the access and clearance issues the Contractor shall be require to remove and re-install the unit as required and make any associated changes to the associated ductwork, piping, wiring and controls at no cost to the Owner.
 - 5. Where required suspend equipment from structure or mount on concrete base or stand with vibration isolators. Vibration isolators are specified under Section "Vibration Isolation and Seismic Restraints."
 - 6. Install sensors and controls supplied with the equipment.
- C. Connections
 - 1. Piping installation requirements are specified in other sections.
 - 2. Drawings indicate general arrangement of piping, fittings, and specialties. Arrange connections as per approved shop drawings.
 - 3. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
 - 4. Install piping adjacent to equipment to allow service and maintenance.
 - 5. Ground equipment.
 - 6. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
- D. Field Quality Control
 - 1. Testing: Perform the following field quality-control testing and report results in writing:
 - a. After electrical circuitry has been energized, start units to confirm proper motor.
 - b. Test and adjust controls and safeties
 - 2. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- E. Cleaning
 - 1. After installing units, inspect equipment for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
 - 2. After installing equipment, clean internally according to manufacturer's written instructions.
 - 3. Install new filters in equipment within two weeks after start up.
 - 4. Basket strainers shall be initially cleaned two week after start-up with a second cleaning two weeks after that.
- F. Start Up
 - 1. Verify that equipment is installed and connected according to approved shop drawings and contract drawing.
 - 2. Adjust flows and controls.
 - 3. Test and adjust controls and safeties. replace damaged and malfunctioning controls and equipment.
- G. Factory Start Up Service
 - 1. Engage a factory-authorized service representative to perform startup service for the following equipment or as specified under Commissioning:

- a. Domestic Booster Pump systems
 - b. Sewage Ejectors
 - c. Domestic Hot Water Heaters
 - d. Gas Pressure Boosters
- 2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
 - 3. Complete installation and startup checks according to manufacturer's written instructions.
 - 4. Prepare a written startup report that records results of tests and inspections.
- H. Demonstration and Instruction
- 1. Engage a factory-authorized service representative to demonstrate the equipment's operation and to instruct Owner's maintenance personnel to adjust, operate, and maintain units as specified under Commissioning.

3.02 PUMP INSTALLATION REQUIREMENTS

- A. The alignment of all pumps shall be checked and each pump shall be properly aligned after the piping is completed and before the pumps are placed in service.
- B. Mechanical seals and shaft sleeves shall be replaced by this Contractor without charge in the event the unusual wear of faulty operation occurs during guarantee period.
- C. Where pumps components are or may come in contact, although the materials may be basically similar, use hardness differentials of at least 50 Brinell to prevent seizure and reduce wear.
- D. Provide shaft packing or seals compatible with the pump design, fluid handled and in accordance with the manufacturer's recommendations.
- E. Balance pump impellers and all other moving components statically and dynamically.
- F. Completely align and level pumps, motors and bases. Where pumps and motors are shipped as a unit, realign them in the field.
- G. Grout equipment base plates completely to provide a rigid-non-deflecting support.
- H. Secure pumps to bases with proper size anchor bolts and vibration isolators.
- I. Each and align mechanical seals in accordance with the manufacturer's recommendations.
- J. Provide water supply for cooling and lubrication of seals and/or packing where required.
- K. **Booster Pump Installation & Field Piping**

Install the system adjacent to a floor drain to prevent building damage in the event of pump mechanical seal failure. The contractor shall interconnect the tank and system, as described above and shall pipe the discharge of the over temperature purge valves to the floor drain. The contractor shall install a full sized bypass around the pump system with check and isolation valves.
- L. Provide flexible connection for pumps. Provide spring hangers for piping for pump to partition or wall penetration.
- M. Pumps must operate stably without pulsation, vibration or internal re-circulation. Pump operating characteristic curves must meet the following requirements:
 - 1. The pump operating point must fall on or below an impeller diameter curve which is not more than 85% of the maximum diameter impeller which can satisfactorily operate in the casing.
 - 2. The pump operating point must fall below the point of no flow head pressure.
 - 3. Pump operating point must be to the right of the midpoints of the peak efficiency curves. Selected efficiency shall be not more than 3% points below maximum efficiency.
 - 4. A 10% increase in head pressure over the specified will result in not more than a 20% reduction in GPM and will not affect the stability of the pump.

- N. Select pumps so that when operating at rated RPM the pump motor cannot be overlooked despite variation in pumping head over entire range of curve.
- O. Where initial and ultimate operating conditions are specified, these shall be achievable by changing the pump impeller with no modifications to the casing.
- P. Upon completion of the installation, test all equipment under field operating conditions to demonstrate capability of the equipment to meet specification requirements.
- Q. Submit results of factory tests with the equipment shop drawings. Include result of factory and field tests in the Instruction Manual.
- R. Perform field tests to demonstrate the ability of the pumping equipment to meet contract requirements. Compile and certify the following data:
 - 1. Water flow, GPM, at rated head.
 - 2. Shutoff head.
 - 3. Operating kilowatts for measured voltage, amperes, power factor.

END OF SECTION

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SECTION 22 4000 - PLUMBING FIXTURES

PART 1.00 – GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide plumbing fixtures as shown on the drawings and as specified herein.

1.03 RELATED WORK

- A. Common Work Results for Plumbing - Section 22 0511
- B. Sanitary, Waste, and Storm Drainage - Section 22 1300
- C. Water Distribution Piping - Section 22 1100
- D. General Duty Valves - Section 22 0523
- E. Plumbing Tests - Section 22 0513

1.04 CODES AND STANDARDS

- A. Comply with applicable portions of: the New York city Building Code, New York City Plumbing Code, New York City Energy Conservation Construction Code, including all administrative decisions.

1.05 QUALITY ASSURANCE

- A. References: ANSI:
 - 1. A112.6.1M "Supports for Off-The-Floor-Plumbing Fixtures for Public Use".
 - 2. A112.19.1M "Enameled Cast Iron Fixtures".
 - 3. A112.19.2M "Vitreous China Plumbing Fixtures".
 - 4. A112.19.3M "Stainless Steel Plumbing Fixtures".
 - 5. A112.19.5M "Trim for Water Closet Bowls, Tanks and Urinals".
 - 6. A112.18.1M "Finished and Rough Brass Plumbing Fixture Fittings".
- B. All fixture trimmings, including faucets, strainers, escutcheons, shower head and arm, water closet supplies, stops, waste trap, escutcheons, visible hanger or chair carrier nuts shall be made of brass and shall be polished chromium plated. All material to be specified as chromium plated and shall be thoroughly and evenly applied and guaranteed not to strip or peel. All chromium plating on plumbing fixture trim shall be in accordance with Federal Spec. WW-P-54 lb for grade "R" plating. Manufacturer shall submit certification that all chrome plating on finished trim meets aforementioned Federal Specification. All plated work shall be highly buffed. Plastic, zinc or white metal will not be approved.

- C. All fixtures shall be free from imperfections, true as to line, angles, curves and color, smooth, watertight, nameplate in every respect and practically noiseless in operation. Fixtures as specified are given as a typical standard and they or other approved fixtures shall be furnished, set and connected in good substantial, neat and workmanlike manner.
- D. Fixtures: vitreous china ware of the best quality, non-absorbent and manufactured so that the whole mass is thoroughly fused and vitrified, producing a material white in color which, when fractured, will show a homogeneous mass, close grained and free from pores. The glazing and vitreous china fixtures shall be thoroughly fused and united to the body, without discoloration, chips, or flaws, and shall be free from craze. Warped or otherwise imperfect fixtures will not be acceptable.
- E. Each supply fixture, casework fixture and equipment, shall be separately controlled by its own stops. Locate as required on wall, above floor or as directed.
- F. All faucets shall have metal handles. Shower valves shall have integral check stops on both hot and cold water supplies.
- G. All trim shall be permanently stamped with manufacturer's identification and shall be visible after installation.
- H. Colors and finishes shall be selected by the Commissioner.

1.06 SUBMITTALS

- A. Fixtures.
- B. Fittings and Faucets.
- C. Shower equipment.
- D. Fixtures literature and product data.
- E. Submit samples consisting of two pieces of each piece of brass work (fitting-trimming-etc.) required in connection with plumbing fixtures and showers, etc., only if other than specified item.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

- A. Plumbing Fixtures:
 - 1. American Standard, Kohler, Crane, Eljer.
- B. Flushometers:
 - 1. Sloan, Delany, Zurn.
- C. Brassware:
 - 1. Nibco, Apollo.
- D. Faucets:
 - 1. Sloan, Moen, Delta.
- E. Water Closet Seats:
 - 1. Church, Olsonite.
- F. Fixture Carriers:
 - 1. Jay. R. Smith Manufacturing Co.
 - 2. Zurn Industries, Inc.
 - 3. Josam
 - 4. Ancon, Inc.
 - 5. Wade Division, Tyler Pipe & Foundry Co.

2.02 FIXTURES

- A. Vitreous china, color as specified by Commissioner, except as noted.
- B. Stainless steel fixtures conforming to ANSI A112.19.3.
- C. For all handicapped traps and supplies provide ADA conforming insulation kits: TruBro Handi Lav-Guard.
- D. Provide suitable floor mounted heavy cast iron chair carrier for each wall-hung fixture. Lag all bolts to slab.
- E. Unfinished surfaces of enameled iron fixtures: factory coat of paint.

2.03 CONNECTIONS

- A. Exposed Pipe, Fittings, Traps, Escutcheons, Valves, Valve Handles and Accessories, Above and Below Fixtures:
 - 1. CP brass.
 - 2. Set screw CP cast brass escutcheons for piping and tubing.
 - 3. Traps: CP cast brass with cleanouts plugs, unless otherwise noted.
 - 4. Covering tubes not permitted.
 - 5. CP type "L" tubing supply risers may be used.
 - 6. Wall hung water closets: chair carriers.

2.04 FIXTURE FITTINGS

- A. Renewable seats or replaceable internal units.
- B. Composition washers.
- C. All metal indexed handles.
- D. Lockshield integral or built-in stops.
- E. Finishes: As selected by Commissioner.

2.05 PLUMBING FIXTURE SCHEDULE

- A. Lavatories (LAV): American Standard "Lucerne" 0355.012, or approved equal, 20" wide by 18" deep, w/backsplash. Faucet: Delta #520 MPU, or approved equal, single lever, 4" spread, chrome finish.
- B. Shower's (SH): Individual shower enclosure with shower rod and curtain. Fiat #86 Commander or approved equal complete with all accessories, terrazzo base, and stainless steel sides. No bench. Faucet: Symmons Hydrapipe #64, or approved equal, single lever, chrome finish. Supply from above w/accessible shut off valves for each stall. Mount on sidewall so as not to spray curtain. Shower Drain: J.R. Smith 2010 with Type 'A' strainer.
- C. Water Closet's (WC): American Standard "Afwall" 3351.001, or approved equal, wall hung, top spud. Flushometer shall be Sloan or approved equal with chrome finish.
- D. Urinal's (UR): American Standard "Lynbrook" model #6601.012 or approved equal. Flushometer to be by Sloan or approved equal with chrome finish.
- E. Fixture Supports: Urinal Lavatory and water closet supports by J.R. Smith or approved equal.
- F. Mop Receptor(MR): Advance Tabco Conventional Model #9-OP-48 or approved equal with the following accessories: Faucet: Model #K-240 or approved equal. Mop Hanger: Model #K-242. Provide American Standard #7837.024 or approved equal vacuum breaker's installed 6'-0" above finished floor including wall escutcheons and chrome plated exposed piping.
- G. Eyewash (EW): Haws Drench, Model #8200, or approved equal, eyewash shower combination.

- H. Kitchen Sink (SINK): Elkay "Avado" Model EFRTU0332210L, or approved equal universal mount two compartment stainless steel sink. Faucet: Elkay Model LK406AT08L2, or approved equal.

PART 3.00 - EXECUTION

3.01 SERVICES TO FIXTURES AND EQUIPMENT FURNISHED UNDER OTHER SECTIONS

- A. Refer to Architectural and Plumbing Drawings for exact locations of equipment and fixtures. Provide all materials, equipment and appliances necessary and required to complete the installation of all fixtures and equipment, including but not limited to the following: plumbing, roughing and final connections, valves, stops, trim, escutcheons, fittings, traps, etc. Install faucets, trim, etc., furnished with the equipment provided by others.
- B. Unless otherwise detailed on Drawings, roughing of proper size and capacity for equipment indicated on Architectural, Heating and Ventilation, Plumbing or Electrical Drawings or provided under another Division or Section shall be provided and installed in such a manner and location that final connection can be made with a minimum of work and without cutting patching permanent walls, partitions, ceilings or floors. Drawings are by necessity, schematic, for special equipment as exact roughing and requirements may vary with different manufacturers.

3.02 INSTALLATION REQUIREMENTS

- A. Make all plumbing connections to all equipment and fixtures requiring such connections as shown on Drawings whether the equipment and fixtures are furnished under this Section or other Divisions or Sections. Investigate the equipment furnished under other Divisions or Sections to determine if combination fittings have a means of shutoff or require the installation of check valves, backflow preventers and/or pressure reducing valves. Make final connections to such, including installations of all special traps, supplies, control valves, etc., furnished with such equipment, and furnish all material necessary that is not supplied with the equipment.
- B. Provide valved water connections in equipment spaces and other locations where shown for the use of other trades or other Sections. On each valved outlet for equipment with submerged inlets, provide a backflow preventer after the shut-off valve. Funnel drains and/or floor drains for the air conditioning, heating and refrigeration work shall be provided.
- C. Fixture supplies and traps as specified, shall be chrome plated cast brass, where exposed to view. Where concealed from view in cabinets, etc., they may be rough brass. All fixture supplies shall have stops.
- D. As soon as installed, all metal fixture trimming shall be thoroughly covered by this Contractor with non-corrosive grease, which shall be maintained until all construction work is completed.
- E. Upon the completion of the Work, all fixtures and trimmings shall be thoroughly cleaned and polished and free from all marks and left in first-class condition.
- F. Upon completion of the Work, test flushometers and faucets for leaks or drips and adjust same for quiet and uniform operation.
- G. All fixtures shall be left thoroughly clean. All plated or polished fittings, pipes and appliances shall be coated with Vaseline, immediately after installation, and shall be finally polished and free from all marks and foreign substances.
- H. Equipment and all connections shall be in accordance with the rules relative to submerged inlets, and shall be provided with all necessary vacuum breakers and check valves, in accordance with the applicable codes.
- I. Connection between any fixture with a floor outlet and the flange shall be made with an approved prepared gasket that shall be a germicide, absolutely gas and fumeproof, watertight, stain-proof,

containing neither oil nor asphaltum, and which will not rot, harden or dry under any extreme of climate change, and must adhere on wet surfaces.

- J. Each fixture shall be separately trapped, using the type and size of trap called for specifically in the Specifications, or the type required by the Plumbing Code. The traps shall be approved type.
- K. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of fixture.
- L. Be responsible for protecting against injury from the building materials, acids, tools and equipment, all plumbing fixtures, and equipment provided under Plumbing Work Sections.
- M. No slip joints will be permitted on water piping.
- N. Flexible supplies will not be permitted to fixtures in lieu of rigid supplies.
- O. Furnish and install all control wiring from plumbing fixture transformers to sensors and solenoids per manufacturers' requirements.

3.03 SEALING

- A. Seal between fixture and wall and/or fixture and floor with silicone sealant.

3.04 FIXTURE HEIGHT

- A. Fixtures shall be installed at height as shown on Architectural Drawings and/or as specified in Fixture Mounting Heights Schedule.

3.05 FIXTURE INSTALLATION

- A. Fixtures shall be installed in accordance with manufacturer's installation instructions. Fixtures shall have their rim and backsplash set level.
- B. Unless otherwise specified or indicated on the Drawings, wall hung water closets shall be siphon jet type.

END OF SECTION

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SECTION 23 0500 - COMMON WORK RESULTS FOR HVAC

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this section includes all labor, materials, equipment, disassembly and re-assembly of equipment, hoisting and rigging, scaffolding and services necessary to complete the Heating, Ventilating and Air Conditioning Work as shown on the drawings and specified herein, including, but not limiting to, the following:
 - 1. VRF System
 - 2. Diffusers
 - 3. Fans
 - 4. Pumps
 - 5. H&V Units
 - 6. Energy Recovery Unit
 - 7. Geo Thermal System

1.03 RELATED WORK

- A. 23 07 00 HVAC Insulation
- B. 23 09 00 Instrumentation & Control For HVAC
- C. 23 05 48 Vibration & Seismic Control For HVAC
- D. 23 21 13 Piping And Accessories
- E. 23 25 00 HVAC Water Treatment
- F. 23 31 13 Metal Ducts
- G. 23 31 17 Acoustical Treatment
- H. 23 37 13 Diffusers, Registers & Grilles
- I. 23 64 50 HVAC Equipment
- J. 23 05 93 Testing, Adjusting & Balancing For HVAC

1.04 SUBCONTRACTOR'S RESPONSIBILITY

- A. Contract drawings for mechanical work are diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, ducts, piping and approximate sizes and locations of equipment outlets. Mechanical trades shall follow these drawings in layout of their work, consult general construction, structural and electrical drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work

will be installed. The drawings indicate size, connections points, and routes of ductwork and piping. It is not intended however, that all offsets, rises, and drops are shown.

- B. The Subcontractor shall be responsible for establishing grades and elevations, checking of all interfaces, and shall verify all dimensions and locations in the field prior to the start of any work and/or installation of equipment piping and ductwork. The Subcontractor shall, at his expense, perform all minor rerouting of piping and ductwork around obstructions from new or existing construction whether or not such conditions are indicated on the plans. Minor rerouting of piping and ductwork is defined as any rerouting, which requires less than 10 linear feet of addition piping or ductwork (measured along the centerline) over and above that shown on the drawings in order to avoid an obstruction. Such rerouting shall be performed with piping or ductwork of a size equal to that shown on the original routing. Whenever an obstruction requires more than a minor rerouting as defined above, the Subcontractor shall report the condition to the COMMISSIONER prior to that start of pipework or ductwork on the affected system. The Subcontractor shall be responsible for neglect of checking all elevations, clearances, dimensions and locations of piping and ductwork systems prior to the start of work on same.
- C. All trades shall cooperate and confer with each other as to locations of their materials and equipment before erecting work, so as to avoid interference as much as possible, and in such manner that will in no way retard progress of construction. In instances where interferences develop, the Subcontractor shall relocate the work as required by COMMISSIONER, regardless of which work was installed first.
- D. Additional and supplemental drawings may, from time to time, be furnished and the same when made are to constitute a part of the original contract drawings and will not depart materially there from.
- E. The COMMISSIONER specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to and arrangement of these connections.
- F. Special attention is called to the contract drawings and specifications involving general construction, electrical work and details thereon. Bidders are notified to carefully scrutinize these documents for the details affecting the performance of the mechanical trades.
- G. The Subcontractor shall be responsible for determining how equipment shall be brought into the building and set in its location. The Subcontractor shall arrange with the equipment vendor to have the equipment broken down into as many pieces as required to rig the equipment into position and shall then be responsible for re-assembling the equipment. The subcontractor shall obtain a certification from the equipment manufacturer that the equipment was assembled correctly and the full equipment warranty shall be honored.

1.05 DEFINITIONS

- A. The following definitions of terms and expressions used in this section are in addition to listing given in General Conditions:
 - 1. "Scheduled" shall mean, "as scheduled on contract drawings".
 - 2. "Concealed", where used in connection with insulation and painting of piping, ducts and accessories, shall mean that they are hidden from sight, as in trenches, chases, furred spaces, pipe shafts or hung ceilings.
 - 3. "Exposed", where used in conjunction with insulation and painting of pipe, ducts and accessories, shall mean that they are not "concealed" as defined herein above.
 - 4. "Singular Number": In all cases where a device or part of the equipment or system is herein referred to in the singular number (such as pump or heating system), it is intended that such reference shall apply to as many such items as are required to complete the installation.

1.06 SITE INSPECTION

- A. All bidders on this work shall visit the job site and become thoroughly familiar with the conditions under which the work will be performed. The submission of a proposal shall be construed as evidence that the bidder has visited the site and has knowledge conditions. Any later claim for extra payment because of difficulties encountered will not be allowed.

1.07 PROTECTION OF PERSONS AND PROPERTY

- A. Safety Precautions and Programs
 - 1. The Subcontractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.
- B. Safety of Persons and Property
 - 1. The Subcontractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:
 - a. All employees on the Work and all other persons who may be affected thereby;
 - b. All the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the subcontractor.
 - c. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
 - d. The work of the City of New York or other separate subcontractors.
- C. The Subcontractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.
- D. The Subcontractor shall erect and maintain, as required by existing conditions and the progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying City of New Yorks and users of adjacent utilities.
- E. When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Subcontractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.
- F. The Subcontractor shall promptly remedy all damage or loss to any property caused in whole or in part by the Subcontractor, anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and for which the Subcontractor is responsible.
- G. The Subcontractor shall designate a responsible member of the subcontractor's organization at the site whose duty shall be the prevention of accidents.

1.08 SCHEDULE OF WORK

- A. Schedule all work to conform to the job progress schedule as submitted to and approved by the COMMISSIONER.

1.09 SUBMITTALS

- A. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.

- C. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Engineer's office each time a shop drawing, product data and/or samples is submitted for review. This time period must be considered by the Subcontractor when scheduling his work.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
- E. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- F. Submit each section separately and include the following:
 - 1. Information which conforms to contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Submittals on all pump and fans shall be complete with performance curves marked with the design points. Additionally, submittals for any pumps or fans that are in series or parallel with other pumps or fans shall include compounded performance curves for analysis by the COMMISSIONER.
 - 3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
- G. Submit samples as directed of items called for in the specifications; samples of the materials which the manufacturer will actually ship shall be submitted for approval after award of contract and be properly labeled or identified.
- H. Submit a minimum of three (3) hard copies of all shop drawings and submittals for Engineer's review.

1.10 SHOP DRAWINGS

- A. Submit shop drawings to COMMISSIONER for review in accordance with the requirements of the contract documents, and as specified in other sections of this specification.
- B. The Sheet Metal Subcontractor shall provide a reproducible CAD shop drawing drawn to 3/8" scale for certification by all trades that coordination has been established. Conflicts and interferences shall be resolved prior to any erection and installation of equipment.
- C. When necessary to eliminate conflicts, the subcontractor shall revise shop drawings as required at no additional cost to the City of New York.

1.11 SHOP DRAWINGS AND COMPOSITE DRAWINGS

- A. The Subcontractor shall promptly prepare and submit all shop drawings required by the specifications, contract and contract drawings, and also all incidental shop drawings required for the proper performance of the work. The shop drawings shall illustrate fully the requirements of the specifications and the contract drawings, and shall accurately show quantities, kind of materials, methods of assembly and all data required for fabrication, erection and installation. The relationship to adjoining work, whether furnished under other subdivisions of this contract or by other subcontractors, shall be properly shown.
- B. The HVAC Subcontractor shall be responsible for coordinating the installation work of all the Mechanical Subcontractors (HVAC, Plumbing and Electrical Work) by means of composite shop drawings as specified herein.
- C. When necessary to eliminate conflicts, the Subcontractor shall revise shop drawings as required at no additional cost to the City of New York.
- D. The composite shop drawings shall be constituted in the following manner: HVAC Subcontractor shall prepare a set of reproducible drawings or AutoCAD drawing files drawn to the scale of 3/8" = 1'-0", indicating thereon all ductwork, major piping, plus structural and architectural background details. He shall deliver this set of drawings to the Subcontractor

for Plumbing and Sprinkler who will draw his work to scale on the drawings. Then the HVAC Subcontractor shall deliver this set of drawings to the Subcontractor for Electrical Work who will superimpose his work on the drawings. The specified order in which the Subcontractors impose their work on the drawings is not intended to grant priority to any one Subcontractor in the allocation of space.

- D. At the completion of this phase, the Subcontractor shall hold a coordination meeting with the other Subcontractors to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the work. If the Subcontractors are unable to reach agreement on a matter of interference among the mechanical trades, the matter shall be submitted to the COMMISSIONER for his binding decision. After the set of drawings has been coordinated and all necessary changes have been made, each Subcontractor shall sign the drawings, attesting to his agreement that all work is clear.

1.12 OPERATION, MAINTENANCE MANUALS AND INSTRUCTIONS

- A. Furnish to the COMMISSIONER six (6) bound and indexed copies of the final approved installation, operations and maintenance manuals.
- B. Manual Contents:
 - 1. The manual shall provide comprehensive detailed information on the approved installation, operation and use, troubleshooting, parts list, lubrication and periodic maintenance schedule, together with the source of replacement parts and service for the items of equipment and the systems covered, including electrical equipment, devices and systems.
 - 2. Where items of equipment or system work in conjunction with one another, the interconnections shall be shown on a single sheet, folded out if necessary. A schematic wiring diagram and a description of operation shall be included.
 - 3. Where separate items of equipment specified herein are combined into a single self-contained unit, the drawings and required data shall treat such item of equipment in such self-contained unit as separate items. Referring to such self-contained unit as one item of equipment will not be acceptable.
 - 4. The manual shall also contain:
 - a. Equipment capacity (input and output).
 - b. Control data including calibration information, wiring diagrams, sequences of operation, schematics, desired and field determined setpoints permanently recorded on the control drawings, and any comments related to field changes to programming.
 - c. A complete written narrative of how each system is intended to operate.
 - 5. All manufacturer maintenance requirements and schedule.
 - 6. All manufacturer warranties.
- C. At the completion of the work, the Subcontractor shall instruct the employees who will have charge of the equipment in the care, adjustment and operation of each piece of equipment. Instruction shall be by competent representatives of the manufacturers involved with adequate time allowed for complete coverage of all owning and operating procedures.
- D. In addition, the Subcontractor shall leave with such employees printed instructions covering the operation and required maintenance of each particular piece of equipment and the Automatic Temperature Control System. Instructions shall be bound and titled and submitted to the COMMISSIONER for approval. Submit six (6) sets.

1.13 CODES AND STANDARDS

- A. Work performed under this Contract shall conform to the 2014 NYC Construction and Energy Codes and shall be subject to control of NYC Department of Buildings.
- B. Wherever requirements of such laws, codes, regulations differ from the drawings or specifications, they shall take precedence over the drawings specifications, and are expressly

made part of the Contract, except where the drawings or specifications are more stringent or require better materials, which would also be acceptable to authorities (i.e., the more stringent code shall always apply).

- C. Any portion of work which is not subject to the approval of the commissioner having jurisdiction shall be provided in accordance with National Fire Protection Association requirements.
- D. Comply with applicable utility company rules and regulations.
- E. Comply with Occupational Safety and Health Act (OSHA) requirements.

1.14 FEES AND PERMITS

- A. The Subcontractor shall secure all permits and pay all fees required by local and state governing bodies necessary to complete the construction. Failure to investigate all applicable payments before the bid submission shall not constitute grounds for additional money from the City of New York. The City of New York shall be furnished with all certificates of approval.

1.15 INSPECTIONS, PROGRESS INSPECTIONS, SPECIAL INSPECTIONS AND TESTING

- A. New York City Building Code requires the City of New York to directly retain the services of an authorized testing agency to perform all required inspections, tests, progress inspections and special inspections as required by the Building Code. The Subcontractor shall provide all required support services required by the inspectors.
- B. Upon completion or partial completion of the permitted mechanical work, inspections, progress inspections, special inspections and tests shall be conducted by approved agencies or special inspectors qualified to conduct such inspections and tests. Inspections and progress inspections shall be performed in compliance with Section BC 109 of the New York City Building Code and Chapter 5000 of the New York City Energy Conservation Code (1 RCNY §5000-01). Special Inspections shall be performed in compliance with Sections BC 1704 and BC 1707 of the New York City Building Code for all mechanical systems regulated by the New York City Mechanical Code, Sections MC 107, MC 507, Chapters 10, 11 and 12. Refer to Article 116 of Chapter 1 of Title 28 of the Administrative Code for additional provisions related to inspections.
- C. Special Inspections of mechanical systems shall include the following as applicable to the system:
 - 1. Visual certification that required components of such systems are complete in accordance with the manufacturer's installation guidelines and the approved construction documents.
 - 2. Supports, hangers, seismic bracing, and vibration isolation equipment are properly spaced and anchored to supporting structure.
 - 3. Installation of required signage and safety instructions.
 - 4. Electrical components are installed and electrical sign-off issued.
 - 5. Ventilation balancing report is complete and in accordance with design documents.
 - 6. Required labeling, operational instructions and safety signage properly posted.
 - 7. All related Special Inspections for such systems are complete.
 - 8. Noise producing exterior mechanical equipment located within 100 feet of habitable room windows shall be tested at the equipment for compliance with the design STC rating of the equipment and Section MC 926 of the New York City Mechanical Code and the New York City Noise Control Code.
 - 9. Required fire and smoke dampers are installed and functioning properly.
- D. Progress inspections of mechanical systems shall include the following as applicable to the system:
 - 1. Through-penetration fire stopping.
 - 2. Fire dampers.

3. Energy code compliance with approved construction documents in accordance with Chapter 5000 of the New York City Energy Conservation Code (1 RCNY §5000-01).
- E. Tests of mechanical systems shall be performed in accordance with the following New York City Building Code and New York City Mechanical Code Sections:
- | | |
|-------------------|---|
| Section MC 507.16 | Commercial Kitchen Exhaust |
| Section MC 810 | Chimneys |
| Section MC 1011 | Boilers, Water Heaters & Pressure Vessels |
| Section MC 1108 | Refrigeration |
| Section MC 1208 | Hydronic Piping |
- F. The following is a list of all required Special Inspections:
- | <u>Special Inspection Item</u> | <u>Code/Section</u> |
|--|---------------------|
| Mechanical Systems | BC 1704.15 |
| Heating Systems | BC 1704.23 |
| Chimneys | BC 1704.24 |
| Firestop, Draftstop, and Fireblock Systems | BC 1704.25 |
- G. The following is a list of all required progress inspections:
- | <u>Progress Inspection Item</u> | <u>Code/Section</u> |
|-----------------------------------|------------------------------------|
| Energy code compliance | BC 109.3.5 and
ECC Chapter 5000 |
| Fire-resistive rated construction | BC 109.3.4 |
- H. Upon completion of all special inspections, testing and building department sign-off, the mechanical subcontractor shall secure all certificates of compliance for the following service equipment and transmit same to City of New York:
1. Air conditioning and ventilation systems.
 2. Refrigeration systems.
 3. Heating systems.
 4. Boilers.

1.16 BOILER PLAN APPROVALS

- A. The complete installation of boilers, burners, fuel oil burning equipment, gas system, electrical work and all other items of work shall be in strict accordance with all laws and the latest rules and regulations of all municipal, Utility Company, and all other public agencies which have jurisdiction.
- B. The Subcontractor shall engage the services of a professional engineer registered in the State of New York who shall prepare and submit all plans and applications to the Department of Buildings and Division of Air Resources of the City of New York, the Utility Company and New York State Department of Environmental Conservation and shall obtain all required approvals. Sixty (60) days from the Letter of Award, the Subcontractor shall obtain all required work permits and approvals from the various agencies. The Subcontractor shall obtain re-approval of documents already submitted to, and approved to, and approved or in the process of approval, by the New York City Department of Buildings and Division of Air Resources and the New York State Department of Environmental Conservation. The Subcontractor shall be fully responsible to make all required modifications and to file all amendments.

PART 2.00 - PRODUCTS

2.01 QUALITY OF MATERIALS AND SUBSTITUTIONS

- A. Substituted equipment, where permitted, must conform to space requirements including required access space. Any substituted equipment that cannot meet space requirement shall be replaced at the Subcontractor's expense. A specific model and manufacturer of equipment may be used as a standard for producing the drawings. Where the Subcontractor elects to use equipment specified other than used as a drawing standard or where the Subcontractor elects to use substitutes if approved, equipment other than that specified, any modifications of related systems (piping, ductwork, etc.) or other trades (Electrical, Plumbing, Structural, Architectural, etc.) or additional cost that results from this equipment shall be borne by this Subcontractor.
- B. Where a specific model and manufacturer of equipment is specified, the Subcontractor shall provide what is specified without substitution. Where specified as "or approved equal", the Subcontractor may substitute equipment except that the burden is upon the Contractor to prove such equality. If the bidder elects to prove such equality he must request the City of New York's and COMMISSIONER's approval in writing to substitute such item for the specified item, stating the cost difference involved with supporting data, and samples, to permit a fair evaluation of the proposed substitution with respect to quality, serviceability, warranty and cost.
- C. A submittal for a proposed substitution must include comparative data of all performance criteria contained in the specifications, schedules and drawings and alienate all differences between the proposed substitution and the specified equipment in terms of space requirements, access requirements, supports, piping and ductwork connections, power wiring, controls and all other changes required to be made in other work including cost adjustment to accommodate the substituted equipment. The COMMISSIONER reserves the right to reject a substitute based upon its compatibility with systems and special layouts or for any performance or construction criteria whether or not that criteria was outlined in the specifications and drawings.

2.02 PRODUCT HANDLING

- A. In addition to the requirements of the General Conditions, the Subcontractor shall be responsible for the following:
 - 1. Responsibility for care and protection of mechanical work rests with the Subcontractor until it has been tested and accepted.
 - 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage for all causes.
 - 3. Coat polished or plated metal part with Vaseline immediately after installation.
 - 4. Protect equipment outlets and pipe, openings with caps.
- B. Insulation and acoustic material within air handling equipment, fan coil units, VAV boxes, ductwork, etc. can absorb damaging moisture and become soiled when shipped and if left outdoors prior to being installed. Absorbed moisture can foster biological growth and can lead to indoor air quality problems at a later date. To minimize damage all such equipment shall be shrink-wrapped prior to shipment from the factory. The shrink-wrap shall only be removed once the units have been move into enclosed spaces within the building.
- C. The Subcontractor shall receive, properly house, handle, hoist, deliver to proper location, equipment and other materials required for the contract.
- D. In the event of damage, immediately make all repairs and replacements necessary for the approval of the COMMISSIONER and at no additional cost to the City of New York.

2.03 MATERIALS

- A. Design:
 - 1. Unless otherwise specified, equipment or material of same type or classification, used for the same purpose, shall be products of the same manufacturer. All material shall be new and of the latest design of manufacturer providing equipment or materials.

2. Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, or other applicable technical standards, suitable for maximum working pressure and shall have neat and finished appearance.
- B. Electrical Characteristics:
 1. It shall be the responsibility of this Subcontractor to ensure that the voltage and current characteristics of the electrical equipment furnished by him shall be suitable for the electrical services as specified.
- C. Lubricating Devices:
 1. Provide oil level gauges, grease cups, grease gun fittings for machinery bearings as recommended by machinery manufacturer; where lubricating means are not easily accessible, extend to accessible, extend to accessible locations. Furnish all grease gun fittings of uniform type.
- D. Belt Guards:
 1. Provide guards to enclose belts, pulleys, sheaves or belt-driven equipment. Construct of galvanized expanded or perforated sheet steel, or 1" mesh wire screen in angle frame with steel angle or channel mounting supports; make guard easily removable for access to belt, pulley or sheave. Conform to NYC construction code. Provide access holes for tachometers.

PART 3.00 - EXECUTION

3.01 SUPERVISION

- A. All work shall be preformed by competent mechanics under supervision of an experienced erection supervisor. The Subcontractor shall, upon initiation of construction, keep a suitable force of men (including supervisory personnel) on the site at all times in order to place all sleeves, inserts, outlet boxes and fixtures, and provide all other openings as are required for the satisfactory installation of equipment.

3.02 COORDINATION

- A. Subcontractor's attention is directed to scheduling of construction and time limitations for each phase of the work. Work shall be coordinated to permit proper setting of the work of other trades.
- B. Where piping work and appurtenances are in place prior to completion of adjacent concrete and masonry work, they must be protected against damage and displacement until construction is completed.

3.03 CUTTING AND PATCHING

- A. All cutting and patching associated with the installation of the HVAC work is the responsibility of the Subcontractor.
- B. No cutting of bearing walls, beams, etc. shall be done without the approval of the COMMISSIONER. All materials, patching and finishing, etc. shall match the surroundings. All cutting and patching shall be done by workman skilled in the trades and in the employ of the Subcontractor for the project. All cutting shall be done with the saw-type edges to give a neat and workmanlike appearance. All pipe holes shall be core drilled unless specified otherwise.

3.04 TEMPORARY OPENINGS

- A. All necessary temporary openings not indicated which may be required for purpose of bringing equipment into building shall be provided as required subject to the approval of the

COMMISSIONER. The Subcontractor shall perform work of providing and maintaining openings and of restoring structure.

- B. Holes provided in General Construction work to permit installation of lines for temporary mechanical services shall, after removal of such lines, be patched as specified.

3.05 CLEAN-UP

- A. The Subcontractor shall be held responsible for the general clean-up of all areas affected by the work in the Contract. All rubbish and accumulative material shall be removed from the premises and the premises left "broom clean" upon completion.

3.06 CLEARANCE FROM ELECTRICAL EQUIPMENT

- A. Piping or Ductwork is prohibited in all electric rooms and closets, telephone rooms and closets, and elevator machine rooms.
- B. Where transformers, switchboards, motor control centers, electric panels, motor starters, and variable speed drives are located in spaces other than those identified in paragraph A above, a minimum of 3 feet clearance to any equipment, ductwork or piping shall be maintained in front of all low voltage equipment (208 volts or less) and 3-1/2 feet in front of all high voltage equipment (460 volts). This work space shall extend from the floor to the height of the equipment, but not less than 6 1/2' above floor. The width of the workspace shall equal the equipment width but not less than 30".
- C. Where transformers, switchboards, motor control centers, electric panels, motor starters, and variable speed drives are located in spaces other than those identified in paragraph A above, no piping or ductwork shall be permitted up to the slab above the equipment footprint.

3.07 TESTING, ADJUSTING AND BALANCING

- A. Make all required adjustments to air or hydronic system devices until all specified performances are met. Prior to testing clean and comb all coils as required. Before commencement of construction, test existing equipment to establish output, etc. Submit certified reports indicating outlet cfm, motor and compressor amperage draw, rpm, static pressure, outdoor temperature at time of test, return air, mixed air, discharge air and setting of all controllers.
- B. Air and water system balancing shall be performed by an organization specializing in system balancing and procedures having experience and shall be certified by AABC (Associated Air Balancing Council), NEBB or approved equivalent agency.

3.08 SUPPORTS, HOUSEKEEPING PADS AND STANDS

- A. Where supports, stands and suspended platforms for machinery, tanks or other equipment are indicated or specified in mechanical work sections, perform as follows:
 1. Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected, and to distribute properly the load and impact over building areas. Conform to 2014 NYC Construction Code.
 2. Locate supports for tanks so as to avoid undue strain on shell and interference with pipe connections to tank outlets.
 3. For tanks containing tubes, check support locations for clearances to pull tubes.
 4. Mount power-driven equipment on common base with driver, unless otherwise indicated, specified or approved.
 5. Submit detailed shop drawings of all supports; obtain approval before fabricating and constructing.
 6. Roof-mounted equipment shall be on prefabricated curbs unless indicated otherwise. Curbs for use with air intakes and relief or exhaust shall be of the insulated double shell type (refer to equipment sections). Equipment mounting rails shall be fabricated

of 12 gauge, all welded, galvanized steel. Rails shall be 10" high with bottom raised cant, 2" x 4" treated wood nailer on top and a galvanized counterflashing cap. Rails shall be of adequate strength to handle the equipment weight.

- B. Housekeeping Pads:
1. Provide concrete housekeeping pads for all floor mounted equipment. Use concrete mix reinforcement where required.
 - a. Where floor is water proofed, construct foundation so that anchor bolts will not pierce waterproofing.
 - b. Finished exposed parts of foundation with cement mortar; fill voids, trowel smooth, bevel edges and corners to make neat appearances; use cement hardener; paint to match finished floor.
 - c. Unless indicated otherwise provide housekeeping pads for all floor-mounting equipment. Pad dimensions, size of foundation bolts, methods of setting, aligning and anchoring of equipment shall be as recommended by manufacturer of equipment and as approved. Make minimum height above finished floor 4" and extend outer edges 2" minimum beyond machinery bed-plate. Submit shop drawings for approval.
 - d. For machinery on pad, provide foundation bolts, sleeves, washers, nuts and templates to locate position on bolts. Make sleeves of steel pipe; finish flush with top of rough concrete. For anchorage, make embedded end of bolts hooked, or threaded with nut and square plate.
 - e. Provide 1" thick grouting between machinery base plate and concrete pad; fill completely the space between them. Clean top of pad; wet if before grouting. Do not remove leveling wedges before grout reaches its final set. Fill voids left by removal of wedges with grout to make neat appearance.
- C. Floor Stands:
1. Unless otherwise indicated, where equipment is indicated or specified to floor mounted on stands or legs, construct of structural steel members or steel pipe and fittings; brace and fasten with flanges bolted to floor.
- D. Suspension Support for Ducts, Pipes, Equipment:
1. Unless otherwise indicated, all pipes, ducts and equipment that are suspended shall be connected directly to the building steel. Where hangers are required between building steel points, supplementary steel members shall be added by the Subcontractor as required to adequately support the load.
 2. Pipes or ducts shall not be supported from other pipes, ducts or equipment.
 3. Hangers form joists shall be attached at the panel points. Pipes and ducts with weights of 50 pounds per foot (total for single or multiple runs) routed parallel with bar joists shall be supported from a minimum of three (3) joists at each hanger point (channel members between joists).

3.09 PAINTING AND FINISHING

- A. Except as specified herein, the finished painting of Mechanical Work within the building and on the roof shall be as specified in Architectural Drawings and Specifications.
- B. All mechanical equipment shall have a factory applied prime and finish coat of paint. Galvanized surfaces shall be considered as finished surfaces for equipment rooms and items concealed from view. Plastic products shall be acceptable without a finish coat of paint. All items of equipment marred or rusted, even though factory finished, shall be repainted.
- C. All welded pipe connections, supports and stands shall be painted with an approved rust inhibitor ("extend" by Permatex or equal) prior to insulating.

3.10 IDENTIFICATIONS

- A. Piping System:

1. All piping systems shall be identified by the name of contents and the direction of flow in accordance with ANSI A13.1 (1981).
 2. Name of contents and directional arrows shall be placed near each valve, on both sides of pipes passing through walls, on long pipe runs at 30-foot intervals.
 3. Names of contents and directional arrows shall be laminated in plastic and wraparound pipe marker as manufactured by Seton Nameplate Co., or approved equal.
- B. Equipment:
1. All items of mechanical equipment such as fans, pumps, air handlers shall be identified by approved nameplates by Subcontractor furnishing equipment.
 2. Nameplates shall be securely affixed to each individual piece of equipment and also to controls for that equipment.
 3. Nameplates shall be aluminum 2 1/2" x 3/4 with black enamel back-ground etched or engraved natural aluminum lettering. Manufacturer shall be Seton Nameplate Company or approved equal.
 4. Equipment shall be identified as to its type and unit number.
- C. Valves:
1. Identify valves and other parts of mechanical systems by means of polished and lacquered brass or aluminum tags, minimum 1 1/2" round or octagonal, with stamped letters and number 1/2" high and filled with black paint. Tag must bear name of particular mechanical system involved and identifying number.
- D. Charts:
1. Charts of valves including valve identification number, location and purpose shall be furnished in duplicate.
 2. Charts of piping system identification shall be furnished in duplicate. Charts shall include the following:
 - a. Service
 - b. Color field
 - c. Legend
 - d. Color of letters
 3. One (1) copy of each chart shall be mounted in a wood frame with clear glass front, and secured to wall, as directed.
 4. Second chart shall be prepared for use in location as directed, provided with approved transparent plastic enclosure for permanent protection. Two (2) holes shall be furnished at top of plastic enclosure to allow for affixing an 8" length of nickel-plated bead chain. Each hole to be reinforced by a small brass or nickel grommet. Plastic enclosures as furnished by Seton Nameplate Company, Brimar Industries Inc., Kolbi Pipemarker Co. or approved equal.

3.11 FIRE-STOP PROTECTION

- A. Where pipes and conduit pass through fire partitions, fire walls or floors, install a firestop that provides an effective barrier against the spread of fire, smoke and gases. Fire-stop material shall be packed tight, and completely fill clearances between pipe and sleeves. Provide escutcheon plates on both sides of all rated construction.
- B. Fire-stopping material shall maintain its dimension and integrity while preventing the passage of flame, smoke and gases. Fire-stopping material shall be non-combustible as defined by ASTM E136.

3.12 ACCESS PANELS

- A. The Subcontractor shall furnish access panels for the installation by the Subcontractor for General Construction for concealed valves, expansion joints, valves, traps, strainers, dampers and other parts requiring accessibility for operation and maintenance.

- B. Access panel size shall be as indicated; when not indicated, make 18" x 18" minimum or larger as directed or required.
- C. Frames shall be 16 gauge steel.
- D. Access panels for use on masonry, tile, drywall shall have frames with flanges to hide rough openings in walls. Style M as manufactured by Milcor, or approved equal.
- E. When access panels or doors are installed in fire-rated construction they shall be fire rated to match the construction.

3.13 ELECTRICAL WIRING DIAGRAMS

- A. Electrical wiring for automatic temperature, safety and interlocking controls for motors, motor starters and other electrical apparatus and devices shall be provided by this Subcontractor, except for wiring of fractional horsepower fan motors which shall be by the Electrical Subcontractor. Power wiring will be under another Division.
- B. Prepare and submit for approval terminal point to terminal point completely coordinated and integrated wiring diagrams for all wiring.
- C. Submit specific wiring diagrams or factory-installed equipment wiring.

3.14 EXCAVATION AND BACKFILL

- A. All excavation is unclassified. The Subcontractor shall inspect the site for soil to be excavated since no compensation will be given where rock is encountered.
- B. The Subcontractor, unless otherwise noted on the drawings, shall do all excavations for trenches, foundations, and pits of whatever kinds necessary for the installation of this work. Bottom of trenches shall have the proper uniform grade wherever possible, or unless otherwise directed.
- C. Trenches are to be excavated to the widths, lines and grades indicated on the drawings and/or specified in the appropriate section of these specifications. Trenches for piping are to be excavated to a minimum width of one foot (1') plus the outside diameter of the pipe. The trench shall be excavated in a manner such that the pipe will be located in the center of the trench with the trench bottom having the proper uniform grade in the direction of flow. Trenches shall be deep enough to provide a minimum of three feet (3') fill over the piping except as may be otherwise indicated on the drawings.
- D. In earth excavation, trenches shall be carried to invert of pipe. If rocks is encountered, carry trench to a point six inches (6") below pipe invert. No pipe shall be bedded directly upon rock and shall be cushioned by a six-inch (6") layer of selected crushed stone or gravel.
- E. The Subcontractor shall do any shoring, bracing, etc., necessary to maintain the banks of his excavation, shall make good any damage done to property of adjoining premises or work of other Subcontractors due to his failure to properly shore his excavation. The Subcontractor shall do all pumping required to keep his excavations, free of water, including rental of pumps, temporary power and labor.
- F. All excavations shall be left open until work has been inspected and approved by the COMMISSIONER. Sufficient time shall be allowed after notice is given that work is ready for inspection for making all examinations and tests. Under no circumstances shall excavated material be left, even temporarily, where it will interfere with the building or other Subcontractor's operations.
- G. Excavations which pass under or within eighteen inches (18") of columns or wall foundations shall be backfilled up to the level of the columns or wall foundations with concrete mixed in proportions to one part cement, three parts sand and five parts coarse aggregate. Excavations shall not undermine foundations at a slope of 1:1 or greater.

- H. All earth backfilling shall be made in layers not to exceed eight inches (8") and each layer shall be thoroughly tamped into place before the next layer is placed. Backfilling shall be clean earth, free of stone, pieces of concrete, rubbish and other foreign materials. Material frozen in lumps or material softer than the adjoining soil shall not be used in backfilling. The Subcontractor shall distribute on the premises as directed all earth remaining after the backfilling.
- I. Any necessary blasting shall be performed by experienced and competent personnel in the most careful manner. All local ordinances and laws relating to blasting and storing of explosives must be strictly observed. No explosives shall be stored on the project property. All subcontractors shall be notified prior to any blasting. Explosives used shall be subject to approval of the COMMISSIONER. The blasting shall be properly covered with blasting mats. Any blasting required shall be performed at such times as to meet reasonable request of the COMMISSIONER.
- J. Any rock encountered within five feet (5') of pipes or building walls shall be removed without blasting.
- K. The Subcontractor will do all patching of bituminous surfaces, concrete walks, driveways, streets, etc. necessary to complete his work. All patching shall match the existing surfaces. Patching shall be done by skilled personnel in their trades.
- L. Provide adequate temporary crossovers for pedestrian and vehicular traffic including guard rails, lamps, flags, as directed; remove same when necessity for such protection ceases.

END OF SECTION

SECTION 23 0513 - COMMON MOTOR REQUIREMENTS FOR HVAC

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Electric Motors, Motor Controllers as shown on the drawings and as specified herein, including but not limited to the following:
 - 1. Furnish and install motors required for mechanical equipment.
 - 2. Furnish motor starters required for mechanical equipment.
 - 3. Coordination of the installation of motors and starters.
 - 4. Motor control devices required for mechanical equipment.
 - 5. All control wiring other than power wiring.

1.03 RELATED WORK

- A. HVAC equipment.
- B. Automatic Temperature Controls.
- C. Electrical specifications for installation of motor starters and power wiring.

1.04 QUALITY ASSURANCE

- A. NEMA
- B. New York City Electrical Code
- C. IEEC

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Wiring diagrams of all manufactured equipment.
 - 2. Electrical equipment terminal-to-terminal point connections.
 - 3. Elementary diagrams.
 - 4. Integrated and coordinate wiring for automatic temperature, safety and interlocking controls for motor starters and motor actuating and actuated devices.
- B. Materials Data: Manufacturer's printed data, test data, recommendations and installation.

1.06 DEFINITIONS

- A. Power Wiring (Motor Power Circuit): Power circuit operating at 120 volts or more, and carries electrical input energy to starter and from starter to motor.
- B. Control Wiring (Motor Control Circuit): Other than power wiring, all other wiring intended for directing or indicating the performance of a motor starter, including connections to actuating and actuated devices.
- C. Motor Actuating Device: Any device performing a switching function in a motor control circuit (i.e., pushbuttons, hand-off-automatic switches, automatic contacting devices, time clocks, etc.).
- D. Motor Actuated Device: Any device which functions in response to voltage received from a motor control circuit (i.e., pilot lights, solenoids, PE, EP, damper motors, etc.).

PART 2.00 – MATERIALS

2.01 MOTORS

- A. General:
 - 1. Motors shall be of proper power and speed to suit the specified makes of equipment. If other makes of equipment [other than specified] are accepted, the proper adjustment of motor speed and power must be included without additional cost. Sizes and types shall be submitted for approval before the equipment is purchased.
 - 2. Motors shall be open dripproof, squirrel cage induction motors rated at 1,750 rpm or 3,500 rpm, as scheduled. Where motors are multi-speed, speeds shall be as scheduled.
 - 3. Motors voltage shall be as scheduled.
 - 4. Unless otherwise specified, motors shall be suitable for operation in either direction of rotation.
 - 5. Unless otherwise indicated, motors shall have a service factor of 1.15.
 - 6. Motors, shall be built in accordance with current NEMA standards (MG-1), except as noted in these specifications.
 - 7. Motors shall be NEMA Design B unless otherwise noted.
 - 8. Fractional horsepower motors less than ½ HP shall be 120 volt, single phase, 60 Hz. Motors ½ HP and above shall be 60 Hz, three phase with voltage as scheduled.
- B. Insulation
 - 1. Insulation system employed shall have been tested by the manufacturer and will be Class H (180°C).
 - 2. Temperature rise shall be in accordance with NEMA limits for the Class of Insulation, Service Factor and Enclosure specified.
 - 3. Unless noted otherwise, motors will be rated for 40 degrees C ambient operation.
- C. Mechanical:
 - 1. Motors shall be built in NEMA standard T-Frame sizes.
 - 2. Dripproof and totally-enclosed motor frames will be of rugged construction and material will be steel, aluminum or cast iron.
 - 3. End bracket will be of cast iron or aluminum construction and aluminum must have steel inserts in the bearing relubrication.

4. Bearings will be anti-friction type and bearing housings will be equipped with plugged provision for relubrication.
5. Bearings will be rated for minimum L-10 life of 20,000 hours assuming bearing load to be calculated with a NEMA minimum V-belt pulley, so located that the center line of the belt load will be located at the end of the NEMA standard shaft extension.

D. Premium Efficiency Motors:

1. Provide premium efficiency electric motors for all polyphase dripproof and totally enclosed motors 1 HP and above. Motor shall have a standard product of an approved motor manufacturer and shall have the following minimum guaranteed full load efficiencies at 1,750 rpm. Submit certification of motor efficiency with equipment shop drawings. Motors for different rpm's shall be of same construction and comparable efficiency at 1,750 rpm motors. Minimum efficiency's shall be as follows:

OPEN DRIP - PROOF (ODP)			
Motor Size (HP)	Speed (RPM)		
	1200	1800	3600
	NEMA Nominal Efficiency		
1	82.5%	82.5%	77.0%
1.5	86.5%	86.5%	84.0%
2	87.5%	87.5%	85.5%
3	88.5%	89.5%	85.5%
5	89.5%	89.5%	86.5%
7.5	90.2%	91.0%	88.5%
10	91.7%	91.7%	89.5%
15	91.7%	93.0%	90.2%
20	92.4%	93.0%	91.0%
25	93.0%	93.6%	91.7%

TOTAL ENCLOSED FAN-COOLED (TEFC)			
Motor Size (HP)	Speed (RPM)		
	1200	1800	3600
	NEMA Nominal Efficiency		
1	82.5%	85.5%	77.0%
1.5	87.5%	86.5%	84.0%
2	88.5%	86.5%	85.5%
3	89.5%	89.5%	86.5%
5	89.5%	89.5%	88.5%

7.5	91.0%	91.7%	89.5%
10	91.0%	91.7%	90.2%
15	91.7%	92.4%	91.0%
20	91.7%	93.0%	91.0%
25	93.0%	93.6%	91.7%

- E. Noise Levels:
1. Sound power levels for all motors will be no greater than the guidelines recommended by NEMA (MGI-12.49).
- F. Tests and Test Data:
1. Motors will be 100% production tested and quality control checked to assure compliance with this specification.
 2. The insulation system will be tested by procedure outlined in NEMA MGI-12.03.
 3. A load test will be performed on each motor to assure compliance with the energy-efficient section of this specification.
 4. Typical test data on each motor will be available if requested.

2.02 MOTOR STARTERS

- A. Fractional Horsepower Starters for Motors less than ½ HP:
1. Thermal overload relay with field adjustment capability.
 2. NEMA 1 general purpose enclosure with flush mounted enclosure and plate.
 3. Quick-mate, quick-break mechanism.
 4. Pilot light indicating activation.
 5. Speed control, where indicated.
 6. Magnetic starter type with HOA switch where required to be automatically controlled by a motor actuating device.
- B. Starter for Motors ½ HP and Above:
1. Combination magnetic starter with unfused, disconnect switch, unless indicated to be fused, or of the circuit breaker type.
 2. Provide an individually fused transformer to permit external control circuit operation at a nominal voltage of 120 volts. Ground unfused secondary wire.
 3. Provide NEMA I Class A enclosure with running overload relay and disconnect for each pole.
 4. Size fusible switch gaps for time delay type fusing. For combination circuit breaker. Provide ambient compensating features extending to 50°C.
 5. Magnetic Starters NEMA Size 3 and Larger: Equipped with an auxiliary control circuit relay arranged to permit the actuation of the starter without introducing holding coil currents into the external control circuit.
 6. Magnetic Starters NEMA Size 5 and Larger, Intended to Operate at a Power Circuit Voltage in Excess of 250 Volts Line-to-Line: Equipped with an integral phase failure protection relay system.
 7. Equip starter with a low voltage, manual reset "lockout" relay arranged to open the main holding coil circuit following a loss of line voltage, and then to maintain it open (pending manual reset) regardless of maintained contact features (if any) in the external control circuit.
 8. Where motors are specified as multi-speed, provide multi-speed starter with speed and direction selector control switch.
 9. Where motors are specified to be reversible, provide reversing start and direction selector switch.
 10. Covers and Combination Starters: Suitably hinged and interlocked with the handle of the disconnect means to prevent opening when the handle is in closed position.
 11. Combination Type Motor Starters: Equipped with approved padlock and key and a means for padlocking its manual line disconnect in the open position.

12. Motor Starters: Equipped with an engraved lamicoid nameplate permanently fastened on the outside of the starter cover, with high white lettering on a black background identifying the motor and system controlled.
13. In addition to auxiliary contacts required for interlocking or indicating purposes, provide magnetic starters with one normally closed and one normally open additional contacts for future use.
14. Enclosure Sizes and Wiring Terminals of Motor Starters: Suitable for the application of copper power and control circuit wires.
15. Motor Starters which are not part of Packaged Equipment: One manufacturer throughout the project.
16. Wire all starter control wires for external connection including spare auxiliary contacts to terminal blocks. Each terminal block point be identified with unique number shown also on submitted wiring diagrams.

2.03 MOTOR CONTROL DEVICES

- A. Furnish mount and wire up manual control actuating devices and pilot lights required in starter covers.
- B. Motor Control Devices in the Starter Covers: Housed in NEMA Class I general purpose enclosures, except that where intended for use in damp or hazardous locations, provide enclosures of the proper NEMA classification for the conditions. Gang together in a single enclosure and wired up to a terminal block two or motor control actuating or actuated devices at a single location.
- C. Contacts for Motor Control Devices: Rated at not less than 10 amperes AC at 250 volts regardless of the actual duty they are required to perform.
- D. Motor control devices shall be suitable for operation at 120 volts.
- E. Pushbuttons: Heavy-duty oil-tight return momentary type. Provide flush mounted in stainless steel faceplate with pilot light and label indicating equipment served, where stations are remotely located.
- F. Selector Switches: Heavy-duty oil-tight maintained contact type.
- G. Pilot Lights: Heavy-duty type with resistor or transformer, equipped with nameplates indicating the operating condition they annunciate.
- H. Devices such as pushbuttons, pilot light and selector switches, where mounted in enclosure other than the cover of the starter: Equipped with nameplates indicating the motor with which they are associated and their function (on-off, manual-automatic, etc.).
- I. Nameplates: Engraved lamicoid, permanently fastened lettering and a black background.

2.04 APPROVED MANUFACTURERS

- A. Motors: Badlor Premium Efficiency Super-E Motor, Lincoln, Gould, Century General Electric, Westinghouse, or approved equal.
- B. Starters: Cutler-Hammer, Siemens, Square D, Allen-Bradley or approved equal.

2.05 VARIABLE FREQUENCY DRIVES

- A. The VFD package as specified consisting of a pulse width modulated (PWM) inverter designed for use on a standard NEMA Design B induction motor, completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.
 1. Environmental operating conditions: 0 to 40°C (104 °F) continuous. VFD's that can operate at 40° C intermittently (during a 24 hour period) are not acceptable and must be oversized. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing.
 2. Enclosure shall be rated UL type 12 and shall be UL listed as a plenum rated VFD. VFD's without these ratings are not acceptable.

- B. All VFDs shall have the following standard features:
1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
 2. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.
 3. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery back up with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.
 4. The VFD's shall utilize pre-programmed application macro's specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.
 5. The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, operating temperature will be monitored and used to cycle the fans on and off as required.
 6. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to setpoint without safety tripping or component damage (flying start).
 7. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.
 8. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430-150 for 4-pole motors. The following table identifies the drive size and model number to be used with each motor and the drive Amp rating:

208 Volts		
HP	Type Code	Amps
1	ACH550-UH-04A6-2	4.6
1.5	ACH550-UH-06A6-2	6.6
2	ACH550-UH-07A5-2	7.5
3	ACH550-UH-012A-2	11.8
5	ACH550-UH-017A-2	16.7
7.5	ACH550-UH-024A-2	24.2
10	ACH550-UH-031A-2	30.8
15	ACH550-UH-046A-2	46.2
20	ACH550-UH-059A-2	59.4
25	ACH550-UH-075A-2	74.8

9. The VFD shall have an integral 5% impedance line reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD's with only one DC reactor shall add AC line reactors.
10. The VFD shall include a coordinated AC transient protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.

11. The VFD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay outputs shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.
12. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communication bus.
13. The VFD shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.

C. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.
2. Two (2) PID Setpoint controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID setpoint shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two parameter sets for the first PID that allow the sets to be switched via a digital input, serial communications or from the keypad for night setback, summer/winter setpoints, etc. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain setpoint of an independent process (ie. valves, dampers, etc.). All setpoints, process variables, etc. to be accessible from the serial communication network. The setpoints shall be set in Engineering units and not require a percentage of the transducer input.
3. Two (2) programmable analog inputs shall accept current or voltage signals.
4. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, and other data.
5. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices, typically programmed as follows:
6. There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications) the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to an VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. The keypad shall display "start enable 1 (or 2) missing". The safety status shall also be transmitted over the serial communications bus. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC.
7. Three (3) programmable digital Form-C relay outputs. The relays shall include programmable on and off delay times and adjustable hysteresis. Default settings shall be for run, not faulted (fail safe), and run permissive. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating 2 amps RMS. Outputs shall be true form C type contacts; open collector outputs are not acceptable.
8. Seven (7) programmable preset speeds.
9. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
10. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and audible motor noise.
11. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows the highest carrier frequency without derating the VFD or operating at high carrier frequency only at low speeds.
12. The VFD shall include password protection against parameter changes.

- D. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). The keypad shall utilize the following assistants:
1. Start-up assistants.
 2. Parameter assistants
 3. Maintenance assistant
 4. Troubleshooting assistant
- E. All applicable operating values shall be capable of being displayed in engineering {user} units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
- Output Frequency
 - Motor Speed (RPM, %, or Engineering units)
 - Motor Current
 - Calculated Motor Torque
 - Calculated Motor Power (kW)
 - DC Bus Voltage
 - Output Voltage
- F. The VFD shall include a fireman's override input and shut down. Upon receipt of contact closures from the fireman's control station, the VFD shall operate at an adjustable preset speed or shut down. The mode shall override all other inputs (analog/digital, serial communication, and all keypad commands) and force the motor to run at the adjustable, preset speed. "Override Mode" shall be displayed on the keypad. Upon removal of the override signal, the VFD shall resume normal operation.
- G. Serial Communications
1. The VFD shall have an RS-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2 bus, and Siemens Building Technologies FLN. Optional protocols for LonWorks, BACnet, Profibus, Ethernet, and DeviceNet shall be available. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. Use of non-certified protocols is not allowed.
 2. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus – keypad "Hand" or "Auto" selected, bypass selected, the ability to change the PID setpoint, and the ability to force the unit to bypass (if bypass is specified). The DDC system shall also be able to monitor if the motor is running in the VFD mode or bypass mode (if bypass is specified) over serial communications. A minimum of 15 field parameters shall be capable of being monitored.
 3. The VFD shall allow the DDC to control the drive's digital and analog outputs via the serial interface. This control shall be independent of any VFD function. For example, the analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive's digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive's digital and analog inputs shall be capable of being monitored by the DDC system.
 4. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass value control, chilled water value control, etc. Both the VFD control PID loop and the independent PID loop shall continue functioning even if the serial communications connection is lost. The VFD shall keep the last good set-point command and last good DO & AO commands in memory in the event the serial communications connection is lost.

- H. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assemble to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level.
- I. All VFD's through 50HP shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad.
- J. Bypass System
 - 1. A complete factory wired and tested bypass system consisting of an output contactor and bypass contactor. Overload protection and shall be provided in both drive and bypass modes.
 - 2. The following operators shall be provided:
 - a. Bypass Hand-Off-Auto
 - b. Drive mode selector
 - c. Bypass mode selector
 - d. Bypass fault reset
 - 3. The following indicating lights (LED type) shall be provided. A test mode or push to test feature shall be provided.
 - a. Power-on (Ready)
 - b. Run enable (safeties) open
 - c. Drive mode select damper opening
 - d. Bypass mode selected
 - e. Drive running
 - f. Bypass running
 - g. Drive fault
 - h. Bypass fault
 - i. Bypass H-O-A mode
 - j. Automatic transfer to bypass selected
 - k. Safety open
 - l. Damper opening
 - m. Damper end-switch made
 - 4. The following relay (form C) outputs from the bypass shall be provided:
 - a. System started
 - b. System running
 - c. Bypass override enable
 - d. Drive fault.
 - e. Bypass fault (motor overload or underload (broken belt))
 - f. Bypass H-O-A position
 - 5. Door interlocked, padlockable circuit breaker that will disconnect all input power from the drive and all internally mounted options.
 - 6. VFD only disconnect (service switch). The drive / bypass shall provide single-phase motor protection in both the VFD and bypass modes.
 - 7. The digital inputs for the system shall accept 24V or 115VAC (selectable). The bypass shall incorporate internally sourced power supply and not require an external control power source.
 - 8. Customer Interlock Terminal Strip – provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in Hand, Auto, or Bypass modes (not functional in Fireman's Override 2). The remote start/stop contact shall operate in VFD and bypass modes.

9. Dedicated digital input that will transfer motor from VFD mode to bypass mode upon dry contact closure for fireman's override. Two modes of operation are required.
 - a. One mode forces the motor to bypass operation and overrides both the VFD and bypass H-O-A switches and forces the motor to operate across the line (test mode). The system will only respond to the digital inputs and motor protections.
 - b. The second fireman's override mode remains as above, but will also defeat the overload and single-phase protection for bypass and ignore all keypad and digital inputs to the system (run until destruction).
 - c. The VFD shall include a "run permissive circuit" that will provide a normally open contact whenever a run command is provided (local or remote start command in VFD or bypass mode). The VFD system (VFD or bypass) shall not operate the motor until it receives a dry contact closure from a damper or valve end-switch. When the VFD system safety interlock (fire detector, freezestat, high static pressure switch, etc) opens, the motor shall coast to a stop and the run permissive contact shall open, closing the damper or valve.
 - d. Class 20 or 30 (selectable) electronic motor overload protection shall be included.
 - e. There shall be an internal switch to select manual or automatic bypass.
 - f. There shall be an adjustable current sensing circuit for the bypass to provide loss of load indication (broken belt) when in the bypass mode.
- K. Warranty
 1. Provide an extended warranty certified for ten (10) years for all parts and labor.
- L. Factory Start-up
 1. Certified factory and on-site start-up shall be provided for each drive by a factory authorized representative. A certified start-up form shall be filled out for each drive with a copy provided to the City of New York, and a copy kept on file by the manufacturer.
- M. Acceptable Manufacturers
 1. VFD shall be manufactured by ABB Automation Model ACH 550, Emerson Electric, Graham or approved equal.

PART 3.00 - EXECUTION

3.01 INSTALLATION

- A. Coordinate with other work described under "Related Work".
- B. Comply with the requirements of the New York City Electrical Code for the control wiring work.
- C. Install in accordance with the equipment manufacturer's instructions.
- D. Provide all control and interlock wiring for all provided HVAC equipment.

END OF SECTION

SECTION 23 0548 - VIBRATION AND SEISMIC CONTROL FOR HVAC

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Vibration Control Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Pumps
 - 2. VRF system
 - 3. Fans
 - 4. Outdoor air unit
- B. Where systems are provided with internal factory mounted isolators, no additional isolators are required.

1.03 RELATED WORK

- A. HVAC Equipment.
- B. Piping and Accessories.
- C. Sheet Metal Ductwork.

1.04 QUALITY ASSURANCE

- A. SMACNA, ASHRAE, NFPA.
- B. New York City Building Code and New York City Mechanical Code.

1.05 SUBMITTALS

- A. Furnish shop drawings adequate concrete reinforcing steel details and templates for all concrete foundations and supports, and all required hanger bolts and other appurtenances necessary for the proper installation of equipment.
- B. Include in the vibration isolation equipment submittal drawings the following information:
 - 1. Isolation mounting deflections.
 - 2. Spring diameters, compressed spring heights at rated load; solid spring heights, where steel spring isolation mountings are used.
 - 3. Equipment operating speed.

- C. Product Data: Manufacturer's printed data, test reports, catalog cuts and recommended method of installation.

PART 2.00 - PRODUCTS

2.01 GENERAL

- A. For the purpose of establishing design and quality, products are identified by several manufacturer's names and catalog numbers. The equivalent items of other manufacturers will be accepted, as approved by the COMMISSIONER. Approved manufacturers are as follows:
1. Sound and Vibration Isolation:
 - a. Mason Industries, Inc. - M.I.I.
 - b. Vibration Eliminator Co. - V.E.C.
 - c. Vibration Mountings & Controls, Inc. - V.M.C.I.
 - d. Consolidated Kinetics Co. - C.K.C.
 - e. Korfund Dynamics Co. - K.D.C.
 - f. Amber Booth - A.B.
- B. Mounting Sizes: Determined by the mounting manufacturer.
- C. Mounting systems, including piping isolator components of the isolation mounting, shall not be resonant with the forcing frequencies of the supported equipment or supporting structure.
- D. Where equipment is located outdoors, vibration isolation equipment shall be weatherproof as required for operation in an exposed environment.
- E. See specification and schedules for deflection and mounting type number.

2.02 FLOOR AND ROOF MOUNTING OF CENTRIFUGAL FANS (3 HP AND LESS) - MOUNTING TYPE 1 SPRING ISOLATORS WITHOUT INERTIA BLOCK

- A. Mount each such fan and driving motor on an integral one-piece structural base, reinforced as necessary to prevent flexure of the base at start-up and during operation of the fan. Include motor slide rails in the unitized structure base for the fan and motor. Drill and tap the structural steel frame to receive the fan and motor so that the frame will act as a template.
- B. Support the structural steel integral base on steel spring mountings. Position these mountings in accordance with the weight distribution to ensure adequate deflection and vibration isolation. Do not use housing or snubbing devices to contain the isolation springs.
- C. Isolator types to be one of the following, or as approved:
- | Type | | | Manufacturer |
|-----------|---|----------|--|
| Type WFSL | - | M.I.I. | - Mason Industries, Inc. |
| Type OSK | - | V.E.C. | - Vibration Eliminator Co. |
| Type AC | - | V.M.C.I. | - Vibration Mountings & Controls, Inc. |
- D. Provide thrust restraints on the discharge of all fans with a total static pressure of 2" and greater. Restraints shall be Mason Type WBD or approved equal.

2.03 FLOOR MOUNTING OF CENTRIFUGAL FANS (5 HP & GREATER) - MOUNTING TYPE 3 SPRING ISOLATOR WITH INERTIA BLOCK

- A. Mount each such fan and motor on a reinforced spring supported concrete foundation. Pour the foundation within a structural perimeter frame set on roofing paper. The structural perimeter frame to be supplied by the vibration isolation vendor and incorporate equipment anchor bolt templates and mounting brackets for each base spring support. Locate spring support under the brackets and

incorporate a neoprene pad and leveling adjustment to raise the entire isolation base 1" above the foundation pad.

- B. Concrete inertia base thickness to be in accordance with the following schedule:
- | Motor Size | Minimum Inertia Block Thickness Required |
|--------------------|--|
| Up to 50 HP | 8" |
| 60 to 75 HP | 10" |
| 100 HP and greater | 12" |
- C. Mounting assemblies to be one of the following, or as approved:
- | | | |
|-------------|---|----------|
| Type KSL | - | M.I.I. |
| Type WPF/AC | - | V.M.C.I. |
- D. Provide thrust restraints on the discharge of all fans with a total static pressure of 2" and greater. Restraints shall be Mason Type WBD or approved equal.

2.04 FLOOR AND ROOF MOUNTING OF CENTRIFUGAL FANS AND AIR HANDLING UNITS MOUNTING TYPE 4 - NEOPRENE-IN-SHEAR ISOLATORS

- A. Mount each such fan and driving motor on an integral one-piece structural base, reinforced as necessary to prevent flexure of the base at start-up and during operation of the fan. Include motor slide rails in the unitized structural base for the fan and motor. Drill and tap the structural steel frame to receive the fan and motor so that the frame will act as a template.
- B. Support the structural steel integral base on neoprene-in-shear isolator mountings. Position these mountings in accordance with the weight distribution to ensure adequate deflection and vibration isolation.
- C. Isolator types to be one of the following, or as approved:
- | | | |
|------------|---|----------|
| Type ND | - | M.I.I. |
| Type RD | - | V.M.C.I. |
| Type 368SD | - | V.E.C. |

2.05 MOUNTING OF CEILING-SUPPORTED FACTORY-ASSEMBLED FANS, IN-LINE PUMPS, HEAT EXCHANGERS, AIR CONDITIONING UNITS AND AIR HANDLING UNITS - MOUNTING TYPE 5 - SPRING ISOLATORS

- A. Hang all such units by means of vibration isolator hangers consisting of a steel housing or retainer incorporating a steel spring and neoprene-in-shear absorbing elements. Isolators shall be provided with a minimum deflection of 1.25".
- B. If the equipment to be mounted is not furnished with integral structural frames and external mounting lugs (both of suitable strength and rigidity), install approved structural subbase in the field which will support the equipment to be hung and to which will be attached the hangers.
- C. Isolators to be one of the following, or as approved:
- | | | |
|-----------|---|----------|
| Type 30N | - | M.I.I. |
| Type RSH | - | V.M.C.I. |
| Type CSNC | - | V.E.C. |
- D. Provide thrust restraints on the discharge of all fans with a total static pressure of 2" and greater. Restraints shall be Mason Type WBD or approved equal.

2.06 MOUNTING OF CONTROL AIR COMPRESSOR - MOUNTING TYPE 9

- A. Each compressor with its driving motor to be bolted and grouted to spring-supported concrete inertia base reinforced as required.
- B. Concrete inertia base thickness to be in accordance with the following schedule:
- | Motor Size | Minimum Inertia Block Thickness Required |
|------------|--|
|------------|--|

5 HP to 20 HP 10"
25 HP to 60 HP 12"

- C. Pour the spring-supported concrete inertia foundation within structural perimeter frame (reinforced as necessary) of the required thickness as indicated in the above schedule. Equip the structural perimeter frame with height saving brackets and stable base spring isolators having spring diameters no less than 0.8 of the compressed height of the spring at rated load. The mountings to provide minimum static deflection of 1". The structural perimeter frame, mounting templates, height saving brackets and spring system to be provided as an assembly by the vibration control vendor.
- D. Mounting assemblies to be one of the following, or as approved:
- | | | |
|-------------|---|----------|
| Type KSL | - | M.I.I. |
| Type WPF/AC | - | V.M.C.I. |
| Type SN-OSK | - | V.E.C. |

2.07 AIR COMPRESSOR FLEXIBLE CONNECTORS - MOUNTING TYPE 10

- A. Install flexible stainless steel metal pipe connectors in two planes 90° to each other in the discharge piping from the compressor. Flexible connectors to have a minimum burst pressure of 4 times the operating pressure. Furnish pipe sizes through 2" I.D. with hex male nipple fittings and pipe sizes 2 1/2" I.D. and larger with fixed steel flanges both sides. Connectors to be one of the following or as approved.
- | | | |
|----------|---|----------|
| Type BSS | - | M.I.I. |
| Type MFP | - | V.M.C.I. |

2.08 MOUNTING OF BOILERS - MOUNTING TYPE 14

- A. Provide piping supports within shafts with suitable bearing plates and two layers of 3/4" thick ribbed or waffled neoprene pad loaded for 50 psi maximum. Separate the isolation pads with 1/4" steel plate.
- B. Mounting to be selected for minimum 1" static deflection and be one of the following, or as approved:
- | | | |
|----------------|---|----------|
| Type superW | - | M.I.I. |
| Type Shearflex | - | V.M.C.I. |
| Type 200 N | - | V.E.C. |

2.09 CURB MOUNTED ROOF TOP EQUIPMENT - PACKAGED AIR CONDITIONING UNITS, MAKE-UP AIR UNITS AND EXHAUST FANS - MOUNTING TYPE 16

- A. Curb mounted roof top equipment shall be mounted on spring isolation curbs. The lower member shall consist of a rectangular steel tube containing adjustable and removable steel springs that support the upper floating section. The upper frame must provide continuous support for the equipment and must be captive so as to resiliently resist wind and seismic forces. All directional neoprene snubber bushings shall be a minimum of 1/4" thick. Steel springs shall rest on 1/4" neoprene acoustical pads and have a minimum deflection of 2 1/2". Hardware must be cadmium plated or galvanized and the springs plated or provided with an approved rust-resistant finish.
- B. Weather proofing shall be provided by a continuous flexible aluminum seal joined at the corners by EPDM bellows. The aluminum seal must be mailed over and provide counterflashing to the curb's waterproofing. Provision shall be made for access ports with waterproof covers at the spring location and 2" insulation on the sides of the lower curb.
- C. Curbs shall be Mason Industries Inc. Type RSC or approved equal.

2.10 MOUNTING OF EMERGENCY GENERATOR

- A. Mount the diesel engine generator structural base provided by the diesel engine manufacturer. The equipment complete with isolation system to be installed on a 4" high concrete pad over the complete floor area of the equipment.

- B. Spring mount assemblies to utilize bare springs with spring diameters not less than that of the loaded operating height of the spring and reverse deflection from operating height to solid height of 1/2". The mountings to provide a minimum static deflection of 1" and incorporate a ribbed or waffled neoprene pad.
- C. Mounting to be one of the following, or as approved:
 - Type SLRS - M.I.I.
 - Type AWR - V.M.C.I.
 - Type KW - V.E.C.

2.11 SUPPORT OF PIPING IN EQUIPMENT ROOMS AND WHERE EXPOSED ON ROOF

- A. All water piping and piping within 50 feet of connected rotating equipment to be resiliently sprung and neoprene supported with mountings providing a minimum deflection of 7/8" for all piping. The spring elements for the pipe hanger mountings to have a natural frequency of no less than 360 HZ.
- B. Provide factory pre-compressed hanger rod isolators for water piping greater than 12" diameter and supplementary steel supports. Pre-compressors to be set for 75% of design rated deflection in the spring element of the hanger rod isolators.
- C. Hanger rod isolators to be one of the following, or as approved, mountings:
 - Type 30N - M.I.I.
 - Type RSH - V.M.C.I.
 - Type DVC - V.E.C.
- D. Floor and roof supported piping isolators to be one of the following, or as approved, mountings:
 - Type SLRS - M.I.I.
 - Type AWR - V.M.C.I.
 - Type KW - V.E.C.

2.12 WATER PIPING

- A. Pipe riser guides, anchors and supports to be located so that there will be no direct metal contact of the piping with the building structure.

2.13 PIPING GUIDES

- A. Weld steel guide bars to the pipe at a maximum spacing of 60". The outside diameter of the opposing guide bars to be smaller than the inside diameter of the pipe riser clamp in accordance with standard field construction practice. Each end of the pipe anchor isolation mounting, which in turn will be rigidly fastened to the steel framing within the shaft.
- B. The all-directional pipe anchor isolation mountings to consist of a telescoping arrangement of two sizes of steel tubing separated by a minimum of 1/2" thick heavy duty neoprene and canvas duck isolation pad. Provide vertical restraints by similar material arranged to prevent vertical travel in either direction; the allowable load on the isolation material not to exceed 500 psi.
- C. Mountings to be Type ADA (Guide) - M.I.I. or approved equal.
- D. Construct low temperature piping guides with a 360°, 10 gauge metal sleeve around the piping. Provide the thermal insulation requirements for the piping between the piping and sleeve. Heavy duty neoprene and canvas duck isolation pad of thickness equal to thermal insulation requirements to space the metal sleeve away from the piping with urethane or other suitable sleeve and isolation pad material. The metal sleeve outside diameter to be smaller than the pipe riser clamp inside diameter in accordance with standard field construction practice. The pipe riser clamp to be rigidly attached to the steel framing within the shaft.

2.14 ANCHORS

- A. Weld the pipe riser clamp at anchor points to the pipe and to pairs of vertical acoustical pipe anchor mountings, which in turn will be rigidly fastened to the steel framing in the pipe shaft.
- B. The acoustical pipe anchor mountings to be capable of safely supporting loads developed by the installed piping and consisting of a bolted assembly of steel plates with laminations of 1/2" thick heavy duty neoprene and canvas duck isolation material. Provide a heat shield of 1/4" mineral fiber as required; the isolation material loading not to exceed 500 psi.
- C. Acoustical pipe anchor mountings to be Type ADA (Anchor) - M.I.I. or approved equal.

2.15 SUPPORTS

- A. Provide piping supports within shafts with suitable bearing plates and two layers of 1/4" thick ribbed or waffled neoprene pad loaded for 50 psi maximum. Separate the isolation pads with 1/4" steel plate.
- B. The isolation pads to be one of the following, or as approved:
 - Type W - M.I.I.
 - Type Shearflex - V.M.C.I.
 - Type 200 N - V.E.C.

2.16 PIPING PENETRATION OF SHAFTS, FLOOR SLABS AND/OR PARTITIONS

- A. Direct contact of piping with shaft walls, floor slabs and/or partition is not permitted. For gaps 1" and less sleeve all uninsulated piping with 1" fiberglass the full depth of the penetration. Gaps larger than 1" shall be filled with heavy-density putty such as Nelson FSP or CLK Sealant, J.M. Clipper "Duxseal" or 3M "Moldable Putty".

PART 3.00 - EXECUTION

3.01 GENERAL

- A. All equipment, piping, etc. to be mounted on or suspended from approved foundations and supports, all as specified herein, as shown on the drawings, or as required.
- B. All concrete foundations, bases, forms, inertia blocks, supports and associated reinforcing shall be provided by the Contractor unless indicated other wise on the drawings.
- C. Erect all floor mounted equipment on 4" high concrete pads over the complete floor area of the equipment, unless specified to the contrary herein. Wherever hereinafter vibration eliminating devices and/or concrete inertia blocks are specified, these items to be in turn mounted upon 4" high concrete pads unless otherwise specified to the contrary herein.
- D. Guarantee the vibration isolation systems to have the required deflection. Mounting systems and components of the isolation mounting not to be resonant with any of the forcing frequencies of the supported equipment or piping. Mounting sizes to be determined by the mounting manufacturer, and the sizes installed in accordance with the manufacturer's instructions.

- E. The installed vibration isolation system for each floor or ceiling supported equipment to have a maximum lateral motion under equipment start-up or shutdown conditions of 1/4". Motions in excess to be restrained by approved spring type mountings.
- F. During equipment installation, floor supported spring isolation bases to be set on 2" spacers between the isolation base and housekeeping pad. After all connection (pipe, duct and conduit) have been made to the equipment and the system filled, the spacers to be removed without change of equipment elevation or transfer of stress to the equipment.
- G. Provide mountings incorporating vertical limit stops with 1/4" spacers. The mountings to serve as blocking during installation. Adjust mountings and remove spacers after equipment operating loads.
- H. Protect all mounting systems exposed to weather and other corrosive environments with factory corrosion resistance. All metal parts of mounting (except springs and hardware) to be hot dip galvanized. Springs to be cadmium plated and neoprene coated. Nuts and bolts to be cadmium plated.
- I. Where steel spring isolation systems are described above the mounting assemblies to utilize bare springs with the spring diameter not less than 0.8 of the loaded operating height of the spring. Each spring isolator to be designed and installed so that the ends of the spring remain parallel during and after the spring specified minimum deflection from loaded operating height to spring solid height of 50% of the rated deflection.
- J. Provide, as shown or as approved, all necessary supports for equipment furnished under this specification. To meet the varying conditions in each case, these supports to consist of pipestands, steel angle or strap hangers, saddles, brackets, etc., as shown or as approved. All such supports to have substantial flanges, bolted to floor construction; hangers to be supported from framing as described herein. Supports to be properly located with reference to any supporting pads, legs, etc., of the equipment carried and must be of such number and so distributed as not to bring any undue strains upon the equipment. All details to be as approved.
- K. Provide suitable brackets, pipestands, piers or other supports for all coils, air filters, mixing and control dampers, etc., securely clamped to steel beams, columns or bearing walls. All details of the work to be shown on the drawings or as approved.
- L. Guarantee that the work as installed under this section of the specifications will not result in the transmission of objectionable noise or vibration to any occupied parts of the building, and take full responsibility for any necessary modifications of this equipment, or of the foundations and supports for the same, necessary to secure this result. Any corrective work required to accomplish the above will be borne at the sole cost and expense of this Contractor.
- M. Provide all required supplementary steel for the suspension and support of piping, ductwork, equipment and all other mechanical work.

END OF SECTION

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SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, connections and services necessary to complete the Preliminary and Final Testing and Balancing Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Fan
 - 2. Diffusers and Grilles
 - 3. Pumps
 - 4. Energy Recovery Unit
 - 5. H & V Units
 - 6. Exhaust Systems
 - 7. Hot Water System
 - 8. Geothermal System
- B. Tests:
 - 1. Perform as noted and in presence of COMMISSIONER and authorities having jurisdiction.
 - 2. Submit Preliminary and Final results for review.
 - 3. Repair or replace defective work, as directed.
 - 4. Pay for restoring or replacing damaged work due to tests, as directed.
- C. Balancing:
 - 1. Balancing and testing of all systems shall be performed and supervised by an independent firm specializing in testing and balancing. Firm must be a member of AABC (American Air Balance Council), NEBB or approved equivalent agency.
 - 2. Work to be performed by qualified technicians under supervision of skilled and experienced specialist engineers.
- D. Permanently mark setting of all valves, dampers and other adjustment devices in a manner that will allow the settings to be restored. If a balancing device is provided with a memory stop, it shall be set and locked.

1.03 QUALITY ASSURANCE

- A. Applicable Standards:
 - 1. National Standards for Total System Balance (American Air Balance Council) or NEBB.
 - 2. ASHRAE.

1.04 SUBMITTALS

- A. Six (6) copies of the Preliminary and Final balancing report shall be submitted and included in operating and maintenance instructions.
- B. Report forms (AABC or NEBB type).
- C. Methods of balancing and details of instruments used.
- D. Copies of air velocity and pressure readings.
- E. Sketches bound in folder showing where readings were taken.

PART 2.00 - PRODUCTS

NOT APPLICABLE

PART 3.00 - EXECUTION

3.01 WORK PERFORMED PRIOR TO TESTING AND BALANCING

- A. The Contractor is responsible for start-up and operation of systems during total system balance. Start-up shall include the following:
 - 1. All equipment shall be operable in safe and normal condition.
 - 2. Temperature control systems installed complete and operable.
 - 3. Proper thermal overload protection in place for electrical equipment.
 - 4. Air Systems:
 - a. Final filters clean and in place. If conditions warrant, the Contractor shall install temporary media in addition to the final filters.
 - b. Duct systems clean of debris.
 - c. Correct fan rotation.
 - d. Fire and volume dampers in place and open.
 - e. Coil fins cleaned and combed.
 - f. Access doors closed and duct end caps in place.
 - g. All outlets installed and connected.
 - h. Duct system leakage shall not exceed the rate specified.
 - 5. Water Systems:
 - a. Flushed, filled and ventilated.
 - b. Correct pump rotation.
 - c. Proper strainer baskets clean and in place.
 - d. Temporary start-up strainer baskets removed.
 - e. Service and balance valves open.

3.02 PRELIMINARY AIR SYSTEMS BALANCING

- A. Balance and adjust air distribution systems in accordance with AABC, NEBB or approved equivalent manual:
 - 1. Adjust damper and registers to deliver or remove indicated air quantities for registers, diffusers and terminal units within $\pm 10\%$ in proper pattern so that there are no drafts.
 - 2. Make pitot readings taken in main trunk ducts in conjunction with inlet and outlet readings.
 - 3. Provide outlet test reports. All reports shall indicate initial readings prior to preliminary balancing and preliminary readings after balancing has been completed.
 - 4. Prepare a list of all system deficiencies which affect the balancing of all air systems and submit to COMMISSIONER for action prior to final balancing.
- B. Test systems to certify compliance with air quantity schedules and with requirements of 2014 NYC Mechanical for:
 - 1. Ventilation.
 - 2. Proper functioning of operating devices. Prepare a list of all non-operational devices which affect the balancing of all air systems and submit to COMMISSIONER for action prior to final balancing.
 - 3. Provide apparatus test reports indicating CFM, total S.P., RPM, AMPS and outside air CFM.
- C. If it is determined that drive changes are required, the Contractor shall provide all necessary new components prior to final air balancing.

3.03 FINAL AIR SYSTEMS BALANCING

- A. Provide final balancing and adjustments to air distribution systems after Contractor corrects all deficiencies. Final balancing shall incorporate all COMMISSIONER comments on Preliminary Balancing Report.
 - 1. Final adjustments to dampers and registers to deliver or remove indicated air quantities for registers, diffusers and terminal units within $\pm 10\%$ in proper pattern so that there are no drafts.
 - 2. Make final pitot readings taken in main trunk ducts in conjunction with inlet and outlet readings.
 - 3. Provide outlet test reports. All reports shall indicate final readings after balancing has been completed.
- B. Final test of systems to certify compliance with air quantity schedules and with requirements of 2014 NYC Mechanical code for:
 - 1. Ventilation.
 - 2. Proper functioning of operating devices.
 - 3. Provide final apparatus test reports indicating CFM, total S.P., RPM, AMPS and outside air CFM.
- C. Comfort Balancing
 - 1. After spaces are occupied it is sometimes necessary to adjust air flow to the spaces that differ from the original design air quantities to accommodate occupant comfort.
 - 2. The Contractor shall return to the job site during the warranty period and adjust and re-balance air outlets as necessary as directed by the City of New York and the COMMISSIONER to improve comfort conditions in certain areas.
 - 3. The Contractor shall allow for three visits back to the job site to make adjustment and shall be prepared to adjust up to 5% of all the air outlets on the project.
 - 4. At the end of the warranty period the Contractor shall re-issue the final air balancing report with all of the adjustments recorded.

3.04 PRELIMINARY WATER SYSTEMS BALANCING

- A. Balance and adjust water systems in accordance with the AABC or approved equivalent manual.
 - 1. Examine system and position valves and cocks in their required open or closed position.
 - 2. Make all requirements as required to balance system and equipment. Submit report indicating GPM to all risers and equipment. Report shall indicate performance characteristics for pumps including total GPM, total dynamic head and actual motor amps.
- B. Mark valve tag of each valve or cock used for balancing to indicate position of valve stem.
- C. Prepare a list of all leaks or defects, inoperational devices and all system deficiencies which affect the balancing of all water systems and submit to COMMISSIONER for action prior to final balancing.

3.05 FINAL WATER SYSTEMS BALANCING

- A. Provide final balancing and adjustments to water systems after Contractor corrects all deficiencies. Final balancing shall incorporate all COMMISSIONER comments on Preliminary Balancing Report.
 - 1. Make all final adjustments as required to balance system and equipment. Submit report indicating final GPM to all risers and equipment. Report shall indicate final performance characteristics for pumps including total GPM, total dynamic head and actual motor amps.
- B. Mark valve tag of each valve or cock used for balancing to indicate position of valve stem.

3.06 PRELIMINARY TESTING OF AUTOMATIC CONTROLS

- A. In cooperation with the control manufacturer's representative, adjust controls to operate as specified. Testing personnel shall check all controls for proper calibrations and list all control requiring adjustment by control installers.
- B. Prepare all list of inoperational control devices which affect all air and water systems balancing and submit to COMMISSIONER prior to final air and water systems balancing.

3.07 FINAL TESTING OF AUTOMATIC CONTROLS

- A. Make final adjustments of controls to operate as specified. Testing personnel shall check all controls for proper calibrations and list all controls requiring further adjustment by control installers.

3.08 SUPPLY AIR SYSTEMS (GENERAL)

- A. Preparation for Total Systems Balance:
 - 1. Total system balance shall not begin until the testing and balancing firm has verified that start-up procedures have been performed as specified in the AABC National or approved equivalent standard.
 - 2. The testing and balancing firm shall measure that amperes of all fan motors before total system balance is started and shall have proper steps to correct and report any overload.
 - 3. The testing and balancing firm shall not continue total system balance if any conditions are observed that are hazardous to the air system. This shall be reported before proceeding further.
 - 4. The testing and balancing firm shall verify all outlets for compliance with design requirements and shall report any variations before starting total system balance.

B. Supply Fans:

1. The testing and balancing firm shall set the fan RPM to provide design total CFM within acceptable limits as indicated in the AABC National or approved equivalent standard and/or required static pressure to operate the system.
2. Fan speed shall not exceed the maximum allowable RPM as established by the fan manufacturer.
3. The final setting of fan RPM shall not result in overloading the fan motor in any mode of operation. Dampers shall be modulated, and the amperes of the supply fan motor shall be measured to ensure that no motor overload can occur. The amperes shall be measured in the full cooling, heating and economizer modes to determine the maximum brake horsepower.
4. After total system balancing, the following values shall be recorded.
 - a. Fan RPM.
 - b. Motor voltage and amperes.
 - c. Entering static pressure.
 - d. Leaving static pressure.
5. Final RPM of the fan shall be set to supply the required CFM with filters artificially restricted to simulate 50% loading. The testing and balancing firm shall verify that the fan motor will not be overloaded when the system is operating with unrestricted, clean filters in place.
6. When applicable, final fan settings shall be based on rated wet cooling coil resistance.
7. Final RPM of the supply fan in systems having mixed air dampers shall be set to provide required CFM with the systems in a logical non-modulating mode (e.g., minimum outside air).
8. When job conditions permit, static pressure shall be measured as follows:
 - a. Static pressure leaving the fan shall be taken as far down-stream from the fan as is practical, but shall be upstream of any restrictions in the duct (such as duct turns).
 - b. No reading shall be taken directly at the fan outlet or through the flexible connection.
 - c. Static pressure entering a single inlet fan shall be measured in the inlet duct upstream of any flexible connection and downstream of any duct restrictions.
 - d. Static pressure entering a double inlet fan shall be measured through the wall of the plenum which houses the fan.
9. In all cases, the reading shall be taken so as to represent as true a value as possible. True value is actual measured static pressure.

C. Outlets:

1. All quantities shall be measured according to the AABC National or approved equivalent standard.
2. The systems shall be balanced so that the total supply air quantity to each space shall be within -5% to +10% of the design amount, unless otherwise noted.
3. All final quantities shall be obtained without generating noise.
4. The pattern for all adjustable outlets shall be adjusted for proper distribution without drafts.
5. If, during total system balance, the testing and balancing firm detects any outlet conditions that will not allow proper balancing to be performed, the facts shall be reported immediately.

D. Filters:

1. Under final balanced conditions, the testing and balancing firm shall measure and record static pressure entering and leaving each filter bank.

E. Coils and Other Devices:

1. Under final balanced conditions, the testing and balancing firm shall measure and record static pressures entering and leaving each coil bank.
2. Under final balanced conditions, the testing and balancing firm shall measure and record static pressures entering and leaving other devices not normally found in a system (such as, but not limited to, sound traps, heat recovery equipment, and air washers).

- F. Temperature Control Dampers (Automatic):
 - 1. All temperature control dampers shall be verified by the testing and balancing firm for proper shutoff when driven closed by the controller. Dampers shall also be verified to be in the same position as indicated by the controller. Required corrections will be by others.
- G. Mixed Air Control:
 - 1. Manual balancing dampers in return, outside, and/or relief air connections shall be restricted as necessary so the system supplies and returns essentially the same CFM in any mode of modulation.
 - 2. The testing and balancing firm shall observe or test mixed air plenums for possible stratification. If freeze-up or other serious problems are likely, the condition shall be reported at once.
 - 3. The testing and balancing firm shall observe the start-up of medium and high pressure systems to check that no dangerous conditions exist. If dangerously low pressure in the fan inlet plenum, or dangerously low pressure in the fan discharge plenum are observed, they shall be reported or corrected at once.
 - 4. The testing and balancing firms shall set the minimum outside air quantity to the required value. If this air flow quantity cannot be properly measured, the temperature method as specified in the AABC National Standards shall be used.

3.09 WATER SYSTEMS

- A. Balance and adjust water systems in accordance with the AABC or approved equivalent manual.
 - 1. Examine system and position valves and cocks in their required open or closed position.
 - 2. Make all adjustments as required to balance system and equipment. Submit report indicating GPM to all risers and equipment. Report shall indicate performance characteristics for pumps including total GPM, total dynamic head and actual motor amps.
- B. Mark valve tag of each valve or cock used for balancing to indicate position of valve steam.
- C. Make repairs to all leaks or defects without additional cost to the City of New York.

3.10 TESTING OF AUTOMATIC CONTROLS

- A. In cooperation with the control manufacturer's representative, adjust controls to operate as specified. Testing personnel shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.

3.11 LOW PRESSURE AIR SYSTEMS

- A. Single Zone System:
 - 1. At completion of balancing, at least one (1) outlet damper shall be fully open on every branch duct.
 - 2. At completion of balancing, at least one (1) branch duct balancing damper shall be fully open.
 - 3. Air flow quantity of the fan shall be determined by pitot tube traverse unless impractical to do so. Traverses shall be taken as close to the fan as allowed by the AABC National or approved equivalent standard. When the quantity cannot be obtained by pitot tube traverse, the summation of the outlet quantities shall be used as the total CFM of the fan. Information shall be so noted on the data sheet.
 - 4. Static pressure shall be measured at all points indicated in AABC National or approved equivalent standard.

3.12 RETURN AND EXHAUST AIR SYSTEMS

- A. Air Inlets:
1. All quantities shall be measured according to the AABC National or approved equivalent standard.
 2. Inlets on systems shall be adjusted to the required quantities with tolerance of + 10%.
 3. At completion of total system balance, at least one (1) inlet of every branch shall be fully open and at least one (1) branch balancing damper in the system shall be fully open.
 4. If, during total system balance, the testing and balancing firm encounters any conditions that will not allow proper balancing to be performed, the fact shall be reported immediately.
 5. Return air inlets installed in ceiling where the space above the ceiling is used as a return air plenum are not to be measured or adjusted.
- B. Fans:
1. The testing and balancing firm shall set the fan RPM to provide design total CFM within acceptable tolerances.
 2. Fan speed shall not exceed the maximum allowable RPM as established by the manufacturer.
 3. The final setting of fan RPM shall not result in overloading the fan motor in any mode of operation.
 4. After total system balance, the following values shall be measured and recorded:
 - a. Fan RPM.
 - b. Motor voltage and amperes.
 - c. Static pressure entering the fan (power roof ventilators need not be measured).
 - d. Static pressure leaving the fan.
 - e. Building static pressure with all doors and windows closed.
 5. Static pressure entering and leaving the fan shall be measured as follows:
 - a. Static pressure readings leaving the fan shall be taken as far from the fan as is practical, but shall be before any restrictions in the duct (such as duct turns).
 - b. No readings shall be taken directly at the fan outlet or through the flexible connection.
 - c. Static pressure entering the fan shall be measured in the inlet duct upstream of any flexible connection and downstream of any duct restriction.
 - d. In all cases, the readings shall be taken to represent as true a value as possible. True value is actual measured static pressure.
 6. Under final balance conditions, the testing and balancing firm shall measure and record static pressure entering and leaving any heat recovery equipment in the system.

3.13 HYDRONIC SYSTEMS

- A. Preparation for Hydronic System Balancing:
1. Hydronic system balance shall not begin until the testing and balancing firm has verified the following:
 - a. System is completely filled.
 - b. System is clean.
 - c. System is free of air.
 - d. All service valves are open.
 - e. All strainers are provided with clean sleeves having proper perforations.
 - f. Three-way valves are properly piped.
 - g. All coils are correctly piped.
 - h. Coil fins are straight and clean.
 - i. Proper balancing devices are in place and correctly located:
 1. Meters
 2. Pressure taps
 3. Thermometer wells

4. Balancing valves
 - j. Automatic temperature control system is in operation.
 - k. There is no entrained air in the suction piping to pumps in an open system which can have a negative effect on the pump performance.
 - l. The pressure is adequate to completely fill the system.
 2. The testing and balancing firm shall measure the amperes of all pump motors before hydronic balancing is started and shall take proper steps to correct and report before proceeding further.
 3. The testing and balancing firm shall not continue the hydronic balancing if at any time hazardous conditions are observed. These conditions shall be reported before proceeding further.
- B. General Procedures:
1. All flow quantities, temperatures and pressures shall be measured according to the AABC National or approved equivalent standard.
 2. If, during the hydronic balancing, the testing and balancing firm determines any conditions that will not permit proper balancing, the fact shall be reported immediately.
 3. At completion of balancing, at least one (1) terminal unit balancing valve in each piping branch shall be fully open.
 4. At completion of balancing, at least one (1) branch pipe balancing valve shall be fully open.
 5. The final position of each balancing valves shall be clearly marked. Any memory devices shall be set to permit closing and reopening the valve to its balanced setting.
 6. The systems shall be balanced so the flow tolerance is in accordance with the AABC National or approved equivalent standard.
 7. The testing and balancing firm shall verify that all automatic controllers operate the correct control valves. The valve position shall be as indicated by the controller.
- C. Flow Meter Balance Procedure:
1. Fluid flow quantities shall be measured using the installed meters provided by others.
 2. The testing and balancing firm shall apply necessary correction factor to the indicated value to account for the density of the fluid flowing in the system.
 3. The initial and final reading of all meters shall be included on the AABC report form or approved equivalent form. All pertinent information regarding each meter shall be listed, such as:
 - a. Designation of terminal
 - b. Manufacturer
 - c. Type
 - d. Size
 - e. Rating
 1. GPM
 2. Pressure differential
 4. If specified, pitot tube traverses shall be taken where required on the drawings, provided valved openings are properly installed.
- D. System Component Balance Procedure:
1. Where there are no flow metering devices, the system component balance procedure shall be used.
 2. Fluid flow quantities shall be calculated by using the measured differential pressure across the system components and comparing it with the manufacturer's flow vs. pressure differential rating.
 3. The testing and balancing firm shall apply any necessary correction factor to the indicated value to account for density of the fluid flowing in the system.
 4. The initial and final values of all stations (components used as flow meters) shall be included on the AABC report form or approved equivalent form. All other pertinent information shall be listed, such as:
 - a. Designation of station
 - b. Rated GPM
 - c. Rated pressure differential
- E. Variable Flow System:

1. Sufficient valves shall be opened or closed to simulate design diversity, if applicable.
 2. All bypass valves shall be set.
 3. The pump discharge throttling valve shall be set to each terminal receives rated flow quantity.
 4. After total system balance, the following values shall be recorded:
 - a. Motor voltage and amperes
 - b. Discharge static pressure
 - c. Suction static pressure
 - d. Block tight head
- F. Pumps:
1. Where there are no meters in the systems, the pump shall be used for estimating the total system flow rate.
 2. Where parallel pump operation is provided, the motor amperes shall be measured with one (1) pump operating to ensure there is no overload.

3.14 TEMPERATURE CONTROL SYSTEMS

- A. In the process of total system balance, the testing and balancing firm shall do the following:
1. Work with the temperature control contractor to ensure the most effective total system operation within the design limitations, and to obtain mutual understanding of intended control performance.
 2. Verify that all control devices are properly connected.
 3. Verify that all dampers, valves and other controlled devices are operated by the intended controller.
 4. Verify that all dampers and valves are in the position indicated by the controller (open, closed, or modulating).
 5. Verify the integrity of valves and dampers in terms of tightness of close-off and of full-open position. This includes dampers in multi-zone units, mixing boxes and VAV terminals.
 6. Check that all valves are properly installed in the pipe system in relation to direction of flow and location.
 7. Check the calibration of all controllers.
 8. Verify the proper application of all normally open and normally closed valves.
 9. Check the locations of all thermostats and humidstats for potential erratic operation from outside influences such as sunlight, drafts or cold walls.
 10. Check the locations of all sensors to determine whether their position will allow them to sense only the intended temperatures or pressures of the media.
 11. Check the sequence of operation for any control mode is in accordance with approved shop drawings. Verify that no simultaneous heating and cooling occurs. Observe that heating cannot take place at VAV reheat terminals until the unit is at minimum CFM.
 12. Verify that all controller set points meet the design intent.
 13. Check all dampers for free travel.
 14. Verify the operation of all interlock systems.
 15. Perform all system verification to assure the safety of the system and its components.

END OF SECTION

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SECTION 23 0700 - HVAC INSULATION

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Insulation as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Ductwork
 - 2. Hot Water
 - 3. Geothermal
 - 4. Refrigerant

1.03 RELATED WORK

- A. Piping and accessories.
- B. Sheet metal ductwork.
- C. HVAC equipment.

1.04 QUALITY ASSURANCE

- A. New York City Building Code, New York City Mechanical Code, ASTM, UL, NFPA, ECCCNY (ASHRAE 90.1-2004).
- B. Codes and Standards:
 - 1. All insulations, jackets, or facings and adhesives used to adhere jacket or facing to the insulation, including fittings and butt strips, shall have non-combustible fire and smoke hazard system rating and label as tested by ASTM E-84, NFPA 255 and UL 723 not exceeding Flame Spread 25, Smoke Developed 50.
 - 2. Accessories such as adhesives, mastics, cements, tapes and cloth for fittings shall have the same ratings as listed above.
 - 3. All products or their shipping cartons shall bear the Underwriters' label indicating that flame and smoke ratings do not exceed the above criteria.
- C. Qualifications of Installers:
 - 1. Insulation shall be applied by experienced personnel in accordance with the best trade practice, guided by manufacturer's printed installation directions.

D. Qualifications of Materials:

1. Every package or standard container of insulation, jackets, facing, cements, adhesives and coatings delivered at the building site for use must have a manufacturer, brand and description of material. In addition, all vapor barriers shall be labeled, indicating the thickness of insulation, product nomenclature and manufacturer.

1.05 SUBMITTALS

- A. Shop Drawings: Shop detail drawings, including method of attachment.
- B. Product Data: Manufacturer's printed data, catalog cuts, test data and recommendations.
- C. Samples, when requested.
- D. Instructions: Installation instructions.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Deliver material properly labeled, packaged and undamaged.
- B. Do not store exposed to weather; provide suitable material to protect from damage.

PART 2.00 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. All insulation shall be as manufactured by Owens-Corning, Certainteed, Johns-Manville, or Armstrong. For the purpose of setting a standard of quality and thermal efficiency, the insulation materials specified hereinafter are materials as manufactured by Owens-Corning and Armstrong.
- B. All adhesives shall be as manufactured by Benjamin Foster or an approved equal.
- C. Except where otherwise insulation types and thickness specified are based on glass fiber insulating materials having a "K" value (BTU per hour per square foot per degree temperature difference per inch of thickness) as listed. Alternate insulation materials shall be estimated on the basis of thickness providing the equivalent heat transfer rates are obtained as herein specified. Insulating materials shall be resilient and moisture resistant so that the insulating properties will not be affected by rough handling, water damage and similar construction hazards.
- D. All adhesives, sealers and vapor barrier coatings shall be compatible with the materials to which they are applied, and shall not corrode, soften or attach such materials in either the wet or dry state.

2.02 INSULATION MATERIALS (PIPE AND FITTINGS)

- A. Pipe Insulation:
 1. Pipe insulation shall be one piece of half sectional UL rated and labeled non-combustible glass pipe insulation system with a "K" as noted in the chart below at the listed mean temperature, except as otherwise specified.

2. All above pipe insulation shall be jacketed with Owens-Corning Fiberglass "Fiberglass 25 ASJ/SSL" (all service jacket) a vinyl coated, reinforced and embossed vapor barrier laminate for hot, cold, concealed and exposed piping operating at temperatures from -60°F to +450°F. Jacket shall have a water vapor permeance of not more than .02 Perms. Jacket and butt strips shall have factory-applied self-sealing pressure-sensitive adhesive.
3. In lieu of above jacket, in exposed areas, Contractor may furnish glass cloth jacket with vapor barrier for cold piping and glass cloth jacket without vapor barrier for hot piping.
4. Expanded closed cell, foam type insulation may be used for drain lines and refrigeration piping smaller than 2" where the piping is not located in return air plenums unless it is approved for such use. The insulation shall be Armstrong, Armacell, Mueller Industries or approved equal. The "K" factor shall be .27 at 75°F mean temperature differential.

B. Fittings, Valves and Flanges:

1. Fiberglass Insulation:
 - a. For fittings on all piping and for valves and flanges on cold piping, apply fiberglass molded or segmental insulation to fittings equal in thickness to that of the insulation to be applied to adjoining pipe. On steam piping, insulating cement may be used as the insulating material for fittings.
 - b. Fittings, valves and flanges on cold pipe shall be protected by a vapor barrier. The barrier shall be of the vinyl segmented type made specifically for the application. The barrier shall be held in place with metal bands and the joint shall be taped. An alternate method of using fiberglass cloth and a glue sizing in two layers may be used as an alternate.
 - c. All fittings, valves, flanges, strainers, and steam traps located in mechanical equipment rooms and in conditioned spaces shall be fully insulated. Insulation shall be of the split type held in place with metal bands.
2. Expanded Form Insulation:
 - a. Insulation for sweat fittings shall be miter-cut pieces of insulation of the same size and type as applied to adjacent piping.
 - b. Insulation for screwed fittings shall be sleeve-type fittings covers made from miter-cut pieces of insulation of the same type as applied to adjacent piping. Inside diameter of insulation must overlap insulation on the adjoining piping.

2.03 INSULATION FOR HOT PIPE

- A. Provide insulation for piping, fittings, flanges and valves of the thickness listed below:

Insulation Thickness in Inches for Pipe Sizes								
Service	Material	Insulation Conductivity		<1"	1 to < 1 1/2"	1 1/2 to 4"	4 to <8"	>8"
		"k" Value	Mean temp. F.					
Hot Water		.25 - .29	125	1.5	1.5	2	2	2

Heating, Heat Recovery Water (200°F or less)	Fiberglass							
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B. Insulation Jackets:

1. Concealed hot pipes shall have factory-applied white fire-retardant jacket, stapled and banded. Pipes banded with not less than three (3) bands per section.
2. Exposed hot pipes shall have factory-applied white fire-retardant jacket with butt strips stapled and banded. Pipes banded with not less than three (3) bands per section.
3. An acceptable alternative for both concealed and exposed hot piping shall be factory-applied white fire-retardant jacket with self-sealing lap and butt strip.
4. Finish calcium silicate with glass cloth adhered with Benjamin Foster BS 30-36, Duralar, Airgas or approved equal. Cement shall be trowelled smooth on glass cloth and fire retardant coating.

2.04 INSULATION FOR COLD PIPE

- A. Provide insulation for piping, fittings, flanges and valves of the thickness listed below:

Insulation Thickness In Inches for Pipe Sizes								
Service	Material	Insulation Conductivity		<1"	1 to < 1 1/2"	1 1/2 to <4"	4 to <8"	>=8"
		"k" Value	Mean temp. F.					
Geothermal Supply & Return (40-60F)	Fiberglass	.21 - .27	75	.5	.5	1	1	1
Refrigerant, Brine, Glycol (<40F)	Fiberglass	.20 - .26	75	.5	1	1	1	1.5
Domestic Cold Water (40-60F)	Fiberglass	.21 - .27	75	.5	.5	1	1	1
Cooling Coil Condensate (40-60F)	Fiberglass	.21 - .27	75	.5	.5	.5	.5	.5

B. Insulation Jackets:

1. Cold pipes concealed and exposed up to 14" shall have factory-applied white fire-retardant jacket with self-sealing lap and butt strip. Ends of pipe insulation sealed off at valves, fittings and flanged shall be Benjamin Foster 35-30, mFm FlexClad, Owens Corning SSL II or approved equal.

2. Cold pipes concealed and exposed over 14" shall have factory-applied white fire-retardant jacket sealed with Benjamin Foster 82-07, Vimasco Corp. 760, Tickorea TIC6070 or approved equal. All circumferential joints wrapped with a 3" wide strip of white fire-retardant jacket adhered with Benjamin Foster 72-07 adhesive. Ends of pipe insulation sealed off at valves, fittings and flanges with vapor barrier finish from Benjamin Foster, Johns Manville, DOW Styrofoam or approved equal.

2.05 INSULATION (DUCTWORK AND PLENUMS)

- A. Provide insulation types for ductwork and plenums as indicated below:

Type	Description
A	Minimum R-6 insulation, 1 1/2" thick, 6 lbs/cu. ft. rigid board with factory-applied white fire-retardant jacket applied with mechanical fasteners. Seal all joints and breaks with 5" wide matching self-sealing tape. Butter all punctures with I-C 501. Where stiffening angles are greater than 1 1/2", provide insulation thickness equal to the angle height.
B	Minimum R-6 insulation, 1 1/2" thick, 0.75 lbs/cu. ft. density glass fiber blanket with factory-applied flame-resistant glass fiber reinforced foil (FRK) and having a 2" flange, lapped and tied with copper-clad steel wire on 12" centers. All laps and joints sealed with Benjamin Foster 85-20, Duro Dyne DDS181, Tom Barrow Co. 321, or approved equal. Ducts having a width greater than 30" provide mechanical fasteners 18" on center to the underside of duct for horizontally run ducts and about the perimeter for vertically run ducts on 24" centers with all penetrations sealed.
C	Minimum R-8 insulation, 2" thick, 6 lbs/cu. ft. rigid board with factory-applied white fire-retardant jacket applied with mechanical fasteners. Seal all joints and breaks with 5" wide matching self-sealing tape. Butter all punctures with I-C 501. Where stiffening angles are greater than 1 1/2", provide insulation thickness equal to the angle height.
D	Minimum R-8 insulation, 2" thick, 1.5 lbs/cu. ft. density glass fiber blanket with factory-applied flame-resistant glass fiber reinforced foil (FRK) and having a 2" flange, lapped and tied with copper-clad steel wire on 12" centers. All laps and joints sealed with Benjamin Foster 85-20, Duro Dyne DDS181, Tom Barrow Co. 321, or approved equal. Ducts having a width greater than 30" provide mechanical fasteners 18" on center to the underside of duct for horizontally run ducts and about the perimeter for vertically run ducts on 24" centers with all penetrations sealed.
E	2" thick calcium silicate block, wired over 1" high rib lath. Finish with two coats of cement over hexagonal wire to a total thickness of 1/2". Wire of copper-clad steel.
F	Fire resistant duct wrap shall be UL and ASTM listed and labeled, NFPA 96 compliant and approved for use in New York City. Duct wrap shall be a non-asbestos safer fiber inorganic blanket encapsulated with a scrim-reinforced foil. Blanket weight shall be 1.38 lbs./sq.ft. with a thermal conductivity of 0.417 at 500°F. Foil encapsulated blanket shall have a flame spread and smoke developed rating of 0/0. Duct wrap shall be 1.5 inches thick and shall provide a 2 hour fire rating. Duct wrap shall be 3M Fire Barrier Duct Wrap 15A, UniFrax FyreWrap, Morgan Advanced Materials FireMaster DryerWrap or approved equal. For commercial kitchen hood exhaust ductwork

provide two layers duct wrap.

- B. Provide insulation indicated above for the following duct services:

<u>Service</u>	<u>Insulation Type</u>
Interior air conditioning supply ducts (exposed)	A
Interior air conditioning supply ducts (concealed)	B
Exterior (outdoor) air conditioning supply and return ducts and plenums	C
Interior outside air ducts and plenums (exposed)	A
Interior outside air ducts (concealed)	B
Flexible ducts between air conditioning and terminal units (VAV boxes, diffusers, etc.).	1" thick blanket with fiber-reinforced foil.
Heating supply ducts:	
-Exposed	A
-Concealed	B
All return air ducts.	Insulated unless installed in return air plenum.
Air conditioning return ducts (concealed)	B
Air conditioning return ducts (exposed)	A
Ventilation supply ducts (no heating)	Uninsulated unless otherwise noted.
Stacks and breeching.	E
Kitchen hood exhaust ductwork and fans.	E or F
Horizontal ductwork offsetting vertical shafts	F

- C. Whenever external duct insulation is specified and acoustical treatment of equivalent insulating effect is required, the external insulation may be omitted ONLY if internal acoustic lining provides a minimum resistance rating of R-5 for interior space and a minimum of R-8 for exterior space.

- D. Outdoor Ductwork

- Outdoor ductwork shall be pitched to prevent ponding.
- For outdoor rectangular duct, in addition to insulation and finishes specified elsewhere apply two (2) coats of weatherproof mastic and embed into wet coat two (2) layers of glass cloth

2. Protect insulation on cold pipes from hangers, guides and rollers by 16 gauge galvanized metal shields (at least three times the insulation diameter in length and 1/3 the insulation circumference in width) on the outside of the insulation and vapor barrier. Hold shields in place by straps. Do not piece the insulation with hangers. Where glass fiber insulation is used on piping 3" and larger, provide half section of calcium silicate covering of equal thickness at metal shields.
3. Do not use staples on vapor barrier jackets.

B. Fiberglass:

1. Adhere jacket and butt strips by removing release paper after insulation is installed on pipe and sealing the lap starting in center of each section, working toward the ends. Lap and butt strips must be pressurized by rubbing with hard tool such as nylon sealing tool.
2. Low temperature pipe insulation with vapor barrier jackets shall have all ends of each section buttered vaportight with sealant to prevent travel of moisture to adjacent sections of insulation if vapor barrier on any one section should leak. Ends of pipe insulation shall be sealed off with Foster 30-35, mFm FlexClad, Owens Corning SSL II or approved equal at all flanges and valves.
3. If glass cloth jacket is used, in lieu of pressure-sensitive adhesive, jacket and butt strips shall be sealed with Benjamin Foster 82-07, Vamasco Corp. 760, Tickorea TIC6070 or approved equal. Staples shall not be used under any circumstances.
4. Where metal bands are used on pipe insulation, they shall be 3/4" wide brass or aluminum bands. Bands shall be spaced to hold the ends and center of each section, and in no case shall the spaces exceed 18". Bands shall not be visible on exposed work.
5. Fittings: Insulation shall be securely fastened to fittings using wire. Apply a skin coat of insulating cement to the insulated fitting if needed to produce a smooth surface. After cement is dry, apply a light coat of Owens-Corning fitting mastic Foster 30-90™ Vapor-Safe Mastic, Polyguard CA-14 or approved equal, UL labeled, Type C for low temperature pipe and Type H for hot pipe. Wrap the fitting with fiberglass reinforcing cloth by 2" on adjoining sections of pipe insulation. Apply second coat of mastic Type C or Type H over the reinforcing cloth, working into the mesh of the cloth. Smooth the surface. Mastic shall be applied at rate of not less than 40 square feet per gallon (approximately 3/64" wet film thickness for UL rated performance).
6. As an option to the above over fiberglass fittings, a polyvinylchloride fitting cover can be supplied, made of continuous one piece premolded, polyvinylchloride material. Low temperature lines shall have all seam edges of cover shall be wrapped with a vapor barrier pressure-sensitive color matching tape. Fittings to be Zeston, Speed-Line or approved equal.

C. Expanded Foam Insulation:

1. Wherever possible, slip pipe insulation onto piping before it is connected. Seal joints with Armstrong 520, or Foster 82-31 adhesive.
2. Where insulation cannot be slipped on, slit insulation lengthwise and apply to piping. Seal longitudinal seams and butt joints with adhesive.
3. Fittings: Joint slit seams and metered joints with adhesive. After the adhesive has dried, carefully slit the fitting over and snap over fitting, leaving seams and joints dry. After line has been tested, all joints shall be joined with Armstrong 520, or Foster 82-31 adhesive.

3.03 INSTALLATION - DUCT INSULATION

A. Rigid Board:

over insulation jacket. Smooth membrane to avoid wrinkles and overlap all seams at least 3". Apply a second coat of same coating to entire surface.

3. For outdoor circular ducts, in addition to the insulation and finishes specified elsewhere, provide .016" Aluminum metal jacket over all insulation material. Jacket shall have Z-point longitudinal seam located on the underside of the duct sealed with weatherproof mastic. All circumferential butt joints shall be sealed with mastic and then with 3" aluminum bands.
4. As an alternate to the methods specified above for rectangular and circular ductwork, the contractor may wrap all exterior ductwork in a weatherproof, self-sealing cladding. The cladding shall be a composite membrane consisting of a multiply embossed UV-resistant aluminum foil/polymer laminate to which is applied a layer of rubberized asphalt specially formulated for use on insulated duct and piping applications. The rubberized asphalt shall act as the substrate adhesive and provides the self-healing characteristics necessary to seal around punctures. Liner shall be similar to Alumaguard by Polyguard or approved equal.

2.06 INSULATION (EQUIPMENT)

- A. Provide insulation as described below for equipment listed:
 1. Insulation shall be 1 1/2" rigid board, Type 705, 6 lb. density.
 2. Covering shall be either 1/2" thick finishing cement over copper-clad hexagonal wire or two layers of presized 6 oz. glass cloths.
- B. Apply the rigid board by mechanical fasteners such as Graham pins and speed washers. Seal joints with an adhesive, as approved and reinforced with a glass cloth membrane over vinyl mastic, or self-sealing matching tape. Butter all pinheads with an adhesive, as approved. If vapor seal board is wired on, use tin edges to protect the corners of the board. Seal all edges and joints.
- C. For equipment with removable heads, (such as coolers and heat exchanger) provide insulation applied to the inside of easily removable sheet metal boxes.
- D. Provide insulation as described above including removable sheet metal enclosure where required (pumps, fans) for the following equipment:
 1. GeoThermal water expansion tanks.
 2. GeoThermal water pumps.

PART 3.00 - EXECUTION

3.01 INSTALLATION OF INSULATION (GENERAL)

- A. Perform all work in strict accordance with the manufacturer's recommendations and the best practices of the trade and the intent of this specification.
- B. Apply all insulation over clean dry surfaces, butting all sections or surfaces firmly together and finishing as hereinafter specified.
- C. Seal all vapor barriers continuous and throughout against moisture penetration.

3.02 INSTALLATION - PIPE INSULATION

- A. Protect of Insulation:
 1. Protect insulation on hot pipes by saddles from hangers, guides, rollers and trapeze.

1. Insulation shall be cut to fit between standing seams and stiffeners and shall be secured to ductwork by impaling over mechanical fasteners. Attach pins to surface of duct and locate them not less than 3" from edge or corner to the board and on maximum 18" centers.
2. All joints shall be tightly butted. Apply Owens-Corning ASJ, Aquafin 2000, 3M 8067 or approved equal joint sealing tape to all transverse and longitudinal seams after ensuring you have a dry, dust-free surface. Use nylon sealing tool to apply pressure to the joint and make a good bond and form a complete vaportight system.

B. Flexible Wrap:

1. The duct wrap shall be applied over clean, dry sheet metal ductwork. Duct wrap shall be installed to allow maximum fullness at corners (avoid excessive compression); minimum voids shall be filled with Owens-Corning No. 110 cement, DAP 00272 cement, DuctMate Low VOC, or approved equal, wet troweled into openings.
2. Insulation shall be butted with facing overlapping all joints at least 2" and sealed with fire retardant vapor barrier adhesive and tied with copper-clad steel wire on 12" centers. Horizontal ducts having a width greater than 30" shall be secured on the underside with mechanical fasteners on 18" maximum center. Velocity run ducts shall be secured about the perimeter on 24" centers. All penetrations shall be sealed.

C. Fire Resistant Duct Wrap

1. Duct wrap shall be installed in accordance with manufacturer's recommendations.
2. Wrap shall be installed over clean, dry, frost-free and dust free ductwork.
3. Wrap shall be installed utilizing either telescoping or checkerboard techniques with 3" minimum longitudinal and perimeter overlaps or butt joints with 6" wide collars made of the same fire resistant duct wrap.
4. For ducts less than 24" in width, wrap shall be held in place by ½" x 0.015" carbon steel bands installed 10 ½" on centers (1 ½" from edge or wrap.)
5. For ducts 24" and larger in width, wrap shall be held in place with 12 gauge copper-coated steel insulation pins welded to duct, 1 ½" square or 1 ½" diameter round galvanized steel clips, installed 10 ½" on center and along perimeter and longitudinal overlaps (1 ½" from edges of wrap). Adhesive type insulation pins will not be accepted.

3.04 INSTALLATION - EQUIPMENT INSULATION

- A. Insulation shall be applied with staggered joints firmly butted and joined. The insulation shall be held in place by steel bands. Bands shall be 1" x 25 gauge galvanized steel spaced on not over 12" centers. All joints and voids shall be filled with Owens-Corning No. 110 cement, Akonaflex Expansion Joint Filler, 3M 540 Sealant or approved equal, well troweled into openings. All joints and voids shall be FRK taped and vapor sealed. They shall be applied over the insulation surface 1" galvanized wire netting laced together at all edges and wired to steel bands with 16 gauge soft annealed wire. Over this shall be applied 1/2" thick layer of Owens-Corning No. 110 cement applied in two layers.
- B. Install metal corner beads at all corners and edges in order to provide a permanent installation. Onto the dry cement surface apply a brush coat of Foster Sealfast 30-36, mFm FlexClad, Owens Corning SSL II or approved equal at the rate of 60-70 sq. ft. per gallon. Embed into the wet coating a layer of 8 oz. canvas smoothed out to avoid wrinkles and lap all seams a minimum of 2".
- C. Apply a second brush coat of Sealfast 30-36, mFm FlexClad, Owens Corning SSL II or approved equal to the entire surface at the rate of 60-70 sq. ft. per gallon. Cleanouts, nameplates and

manholes shall not be insulated and the insulation on surrounding surfaces shall be neatly beveled off at such openings.

3.05 INSPECTION

- A. Upon completion of the installation, visually inspect each insulated area and verify that all insulation is complete and properly installed.

END OF SECTION

SECTION 23 0900 - INSTRUMENTATION & CONTROL FOR HVAC

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Provide, completely ready for operation, an automatic temperature control/building automation system (BAS) as described herein. The system shall include a PC based front-end computer. Provide, completely ready for operation, an automatic temperature control/building automation system (BAS) as described herein. The system shall include a PC based front-end computer and portable operating terminal (tablet).
- B. Provide in addition to the controls specified in this Section, the installation of additional automatic controls, supplied with mechanical equipment as specified and all controls shown on drawings.
- C. The system shall consist of a combination of a microprocessor based direct digital control system using electronic (digital) sensors and devices, and electronic damper actuators, electronic valve actuators, and local electric controls as specified.
- D. Provide software drivers, BACnet/ IP, MODBus, Infinet, Lap, Email SSL, and BACnet protocols to allow BAS to interface directly with equipment which specified to have a high level interface. Systems using gateways to route proprietary devices and objects to BACnet are not acceptable.
- E. The control system shall be supplied with a complete web enabled package. The system shall support unlimited users using standard web browsers such as Internet Explorer and Chrome. The web server software shall operate on standard industry PC servers. Proprietary servers or "black boxes" are not acceptable. Web browser software shall be manufactured by the control system manufacturer and shall have the same look and feel as the operating system. Third party web software is not acceptable.

1.03 QUALITY ASSURANCE

- A. Vendor Qualifications:
 - 1. Except as modified by local governing bodies and Contract Document, comply with UL, ASME, ASTM, ASHRAE, NEPA.
- B. Approved BAS manufacturers include Johnson Controls Metasys, Trane tracer SC, Schneider Electric Continuum or approved equal.

1.04 SUBMITTALS

- A. Submit shop drawings for approval by Commissioner before an field installation is started giving complete description of all control elements and showing complete system architecture, schematic wiring diagrams, indication control devices, control and interlock wiring, controller setpoints, sequence of operation, high and low alarm limits, details and installation requirements. Drawings to indicate specifically the type of finish of all room type controls, subject to Commissioner approval.
- B. Provide complete points list.
- C. Description of all application programs and their interaction with the specified sequence of operation.

1.05 DOCUMENTATION

- A. The Subcontractor shall provide complete system documentation at acceptance time, as specified herein. Documentation shall be provided in six (6) sets. Documentation shall include the following:
 - 1. Operator's Manual with keyboard pictures and step-by-step procedures. This manual shall be indexed, and shall be a separate tabbed section for each operator function.
 - 2. Operator's/Programmer's Manual with complete description of all keyboard programming functions including application data for all programs. Provide 12 sets of unused programming forms as shown in the manual and as used on this job.
 - 3. Cards showing equipment normal operating conditions and significant points such as electric test points.
 - 4. Routine preventive maintenance procedures and corrective diagnostic trouble shooting procedures.
 - 5. Part lists with manufacturer's catalog numbers and manufacturer's ordering information.
 - 6. List of tools, operating materials and supplies and test equipment recommended for operation and servicing.
 - 7. Detailed description of changes resulting from contract field installation and modification.
 - 8. A table of contents listing the sheets in the manual, illustration and tabulations, at the time of issuance.
 - a. Documentation shall be provided in vinyl plastic hard cover binders, silk screen-printing. If a single binder is too unwieldy for the material to be included, assemble material in multi-volume sets.
 - b. Binder shall heavy duty and oversized to accommodate up to 1/2 inch thick set of additional information.
 - c. Provide plastic printed tabs for major sections and apron foldouts for oversized pages.
- B. Subcontractor shall provide:
 - 1. A set of those spare parts that are of a modular nature, including at least one of each type of sensor, function card, output device and relay utilized in the system.
 - 2. A list of recommended spare parts to be kept by City of New York. Also included shall be:
 - a. Estimated quantities for a year of operation.
 - b. Source and availability of non-standard parts.
 - 3. One set of special tools required for each site.

1.06 OPERATOR INSTRUCTION

- A. The Subcontractor shall conduct formal operator instruction in accordance with the specification. In addition, instruction shall be performed for three operator levels, and shall include the following with a minimum dedicated instructor time as specified:

1. Level 1: Basic data display and interpretation of graphics, addresses, and alarm and status descriptors. The operators shall be instructed to interpret all alarm displays and printouts, request all data displays, and acknowledge and reset alarms.
 2. Level 2: Intermediate command and program change operations. This level of operators shall be instructed to execute all manual commands (start/stop, control point adjustment), and request all logs, change analog alarm limits, and change time based on/off program times and load assignments.
 3. Level 3: Total system programming. This level of operators shall be instructed to install all other programs and program changes specified herein to be keyboard programmable. This instruction program shall allow for a complete understanding of all application package, custom data files and user programs, and the ability to write and change new and existing specified programs. Emphasis shall be placed on maintenance management system allowing the user to be thoroughly familiar with all aspects of the maintenance and inventory control programs. Additionally, Level 3 personnel shall be given sufficient instruction to allow: (1) in-house diagnostics and troubleshooting of the operating system and all peripherals and to perform routine preventive maintenance; (2) ability to change DCP circuit boards and associated hardware; (3) ability to install all DCP equipment; and (4) installation of all monitor and control points.
- B. Level 1 classes shall be given for a minimum of twenty (20) hours at the building site to six (6) people selected by the City of New York. Level 1 classes shall be repeated six months after system acceptance for six (6) people selected by the City of New York.
- C. Four (4) persons who have complete Level 1 instruction shall participate in the Level 2 classes given for a minimum of forty (40) hours on-site. Three (3) persons who have completed Level 2 shall participate in the Level 3 classes for a minimum of twenty-four (24) hours at the site.
- D. The hours of instruction listed for Level 1, 2 and 3 classes shall be a minimum.
- E. The instruction shall be structured as follows:
1. Limit class size to a maximum of six (6) for classroom instruction.
 2. Limit computer instruction to two (2) people per computer.
 3. Class duration shall be limited to four (4) hours.
 4. First ten hours of level 1 instruction shall occur within two weeks of the system being made operational; the remaining hours shall be given after system acceptance.
 5. Only formal instruction classes shall be included in the hour count; informal instruction during system set-up shall not be considered.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials protected and undampened, with cartons labeled as to manufacturer and contents.
- B. Store materials in locations and in a manner to protect same from damage of any kind as directed by Commissioner.

PART 2.00 - PRODUCTS

2.01 GENERAL

- A. Provide as herein specified a complete and operational automatic temperature control system of the digital/electric type.
- B. The control system shall be complete with all necessary panels, computers, LAN networks, file servers, control devices, thermostats, transmitters, switches, dampers, motors and relays, and software to provide the functions described under sequence of operation, regardless of whether or not specifically specified.
- C. All dampers of the automatic type shall be provided under this section for installation under sheet metal work. All control valves, fittings, and sensor wells, shall be furnished under this section for installation under piping work.
- D. Provide lamicoid identification plates for all control devices.

2.02 CONFIGURATION OF DIRECT DIGITAL CONTROL SYSTEM

- A. The system shall consist of the following:
 - 1. Microprocessor based data gathering and control panels (DCP's) and smaller unitary or application specific controllers (UC) shall be main system controllers and shall perform all automated energy management functions, real time direct digital control, perform all necessary calculations and maintain all program data in memory. DCP's shall be capable of controlling the system on their own without the front-end computer on line. Communication with DCP shall be through English language commands from a panel mounted keyboard and a portable plug-in keyboard and the alpha numeric terminal. Provide one portable operating terminal to the City of New York.
 - 2. The primary operator interface with the system shall be through a multi-tasking, multi-use LAN network with PC based computers as follows:
 - a. The primary operator station shall be a PC-based front-end computer located in the Captain's office. This computer shall operate under the "Windows" environment. The front-end shall consist of a high speed PC using the latest microprocessor and co-processors chips (chip commercially released within twelve months of system installation), high-resolution color display (22"). 8 GB RAM, 2-1 TB hard drives, touch screen interface and communication cards, standard keyboard, and mouse. The front-end shall be provided with a color inkjet printer (Epson Stylus 1500, Cannon Pixma Pro 9500, HP Office Jet 8100 or approved equal).
 - b. Provide high speed LAN network to support multiple, multi-tasking and multi-user front-end computers.
 - 3. Portable Operator's Terminal. Furnish a Portable Operator's Terminal that shall be a tablet capable of accessing all system data. This device may be connected to any point/object on the system network or may be connected directly to any controller for programming, setup, and troubleshooting via bluetooth or Wifi. The terminal shall use the Read (Initiate) and Write (Execute) Services as defined in Clauses 15.5 and 15.8, respectively, of ASHRAE Standard 135-2004, to communicate with BACnet objects in the internetwork.
 - 4. Data transmission shall consist of a high-speed local area network consisting of twisted wire pairs, twisted shield wire pairs, or coaxial cable as recommended by the manufacturer. The

system shall also have the capability of using a fiber optic communications system for communication with the front-end computer and future equipment.

The transmission system shall be installed with the capacity to handle the throughput for an ultimate system build-out of "100" points without speed measurable speed degradation. The LAN shall be capable of being extended from all DCP's.

5. "Points" shall be provided as listed on the drawing or as specified. Points shall be either Analog Output (AO), Analog Input (AI), Digital Output (DO) or Digital Input (DI). Points shall be sensors, relays, control devices, transducers as required to perform a specified function.
6. Software including all licensing shall be provided for all system operating and executive programs including off-site operator home computers (off-site systems shall have full front-end capability), English language operation and data display, password protection, dynamic color graphics and data displays and application programs.

2.03 DATA GATHERING, CONTROL PANELS AND UNITARY CONTROLLERS

- A. If an existing DCP is to be reused the panel shall be upgraded to the requirements as specified herein.
- B. The DCP and UC shall provide for distributed processing of data and shall function as the overall system coordinator, perform automated energy management functions, control peripheral devices, and perform all necessary calculations. Each DCP shall have a built-in operator interface including LCD display and operator keypad and DCPs and UCs shall have an RS-232 port such that a lap top PC or handheld programmable controller can be connected to the system. The DCP and UC shall include algorithms incorporating proportional, integral, and derivative (PID) gains for all applications. All PID gains and biases shall be field adjustable by the user. DCP and UC that incorporate PI control algorithms only are not acceptable.
- C. As a minimum a separate DCP shall be located in each mechanical equipment room.
- D. The DCP and UC shall have a battery-packed, uninterruptible real-time clock to provide time of day, month, year, and day of week. The clock shall automatically correct for daylight savings and leap years.
- E. Power supply to the DCP shall be 120 volts, 60 Hz power, and the system shall function down to 105 volts. Below this point, the system shall operate as if a power outage. DCP shall report power outage to front-end computer. Upon power restoration, DCP shall initiate orderly start-up under Power Failure Restart Program. UC shall be system powered and not require a separate 120 volt connection.
- F. Power failure shall cause the internal clock, memory, and computation function of the DCP to continue to operate on the twenty-four hour battery back-up and battery charger provided within panel.
- G. Recovery from power failure shall automatically, and without operator attention, update all functions and resume operation based on the current time and status. The DCP shall implement special power failure restart strategies and log the time of outage and power restoration.
- H. Provide all DCP's as necessary to connect the data-collecting system and to connect the field sensors and the control devices. The DCP shall be fully supervised to detect failures and shall report the status of all data points. DCP in mechanical equipment room shall be equipped with a

fiber optic modem to allow communications with the front-end computer via a dedicated fiber optic line.

- I. Spare capacity in the I/O boards in DCPs shall be provided to accommodate expansion expansion as scheduled below:

analog input	-	20% of installed point capacity
digital input	-	20% of installed point capacity
analog output	-	20% of installed point capacity
digital output	-	20% of installed point capacity

Spare capacity shall be installed such that it shall be possible to expand all analog and digital inputs and outputs as listed above simultaneously.

- J. Upon failure of the data transmission system the DCP shall continue to operate the connected equipment on a stand-alone basis. The application programs which shall reside in the DCP shall be programmed start/stop, optimal start time, run time totalization, and automatic temperature control.

- K. Upon failure of the DCP the system shall revert to adjustable fail-safe set points.

- L. DCP shall be capable of handling start/stop commands, mode changes, control point adjustments, direct digital temperature control, digital alarms, status inputs and any analog inputs such as temperature, humidity, etc. on a standalone basis.

- M. Mechanical Characteristics:

1. All metal construction. If the manufacturer's standard for the DCP enclosure is not metal, the DCP shall be mount the standard panel within a locking metal panel. A metal enclosure shall not be required for Unitary Controllers serving terminal equipment such as VAV boxes.
2. Full front hinged door with nameplates for DCP identification.
3. The same key lock on all DCP shall be provided.
4. Non-glare surface.
5. The enclosure shall be designed to exclude dust and to withstand the environment that exists in mechanical rooms and must conform with NEMA-1 requirements.
6. Fully wired DCP's shall be adequate gutter space on all sides.
7. All control panels shall be freestanding, attached to building structure. Vibration isolation for the panels shall be as required to protect electronic equipment.

- N. Electrical Characteristics:

1. A pilot light indicating power on.
2. A 115 volt AC service outlet for use of test equipment.
3. Circuit protection including surge transient protection for the data collection hardware.
4. Factory prewired.
5. Terminal strips identified for on-the-job installation.

- O. DCP shall be capable of operating in ambient temperature of between 40 degrees F and 120 degrees F and humidity conditions to 90 percent RH. Where the environment is harsher than the equipment can tolerate, provide either a heat pipe based cabinet cooler (Noren Products Inc., Thermacore Inc., ams Technologies or approved equal) or an industrial air-conditioned enclosure for the DCP as required.

- P. The location of DCP's shall be subjected to the approval of the Commissioner. DCP's shall not be located directly underneath valves or other areas where they may be subject to water or heat damage. In addition, DCP's shall occupy a space between 2 and 7 feet above the floor, with a minimum 3 foot clearance in front.

2.04 DATA TRANSMISSION SYSTEM

- A. Provide all data transmission wiring between the DCP's, UCs and front-end computers as required.
- B. Communications between DCP's UCs, and sensors or control points shall be hard wired.
- C. For wiring between front-end computer and DCP's and between DCP's provide an additional spare transmission cable. Transmission cable shall be left unconnected for use in event of primary cable failure. Provide a terminal strip or splice panel to allow for the connection of future DCP's to the transmission cable.
- D. All transmission network entries into the DCP's shall be transformer coupled or surge transient protected to prevent common mode voltages from causing signal errors and to provide a high degree of noise rejection. The transmitted pulses shall not cause any net D.C. charge on the cable which would produce D.C. transients.
- E. Arrange with the City of New York for the installation of telephone connections for modems.

2.05 SENSORS (GENERAL)

- A. Provide the following instrumentation as required by the monitoring, control and optimization functions. All temperature sensors shall use platinum RTD elements only. Nickel or silicon are not acceptable. All control signals shall be via a 4-20 MA loop or as specified. Provide following sensors with no substitutions.

1. TEMPERATURE SENSORS:

a. SPACE TEMPERATURE:

Temperature monitoring range	0°/110° F
Output Signal	4-20 mADc
Installation adjustments	none required
Calibration adjustments	zero & span
Factory calibration point	70°F
Accuracy at calibration point	
1000 Ohm platinum RTD element	± 0.1 F
Dimensions	3.15"H X 2.15" W X
1.63"D	
A/D Converter to be supplied	
With RTD sensor by Mamac	
TE211 Y or Z	Digital Pulse Output

b. LIQUID IMMERSION TEMPERATURE:

Temperature monitoring range	+20/+120 F
	+70/+220 F
Output Signal	4-20 mADc
Installation adjustments	none required
Calibration adjustments	zero & span
Factory calibration point	70 deg F
Accuracy at calibration point	
Platinum RTD element	±0.5F
Sensor	±0.7F
Dimensions	
Sensor probe length	4.75"L

Overall size	2"H x 5"Wx9.5"D
c. DUCT (SINGLE POINT) TEMPERATURE:	
Temperature monitoring range	+20/+120 F
+70/+220 F	
Output Signal	4-20 mADc
Installation adjustments	none required
Calibration adjustments	zero & span
Factory calibration point	70° F
Accuracy at calibration point	
Platinum RTD element	±0.1 F
Sensor	±0.1 F
Dimensions	
Sensor probe length	19"L
Overall size	4"H x 2"W x 21"D
d. DUCT (AVERAGING) TEMPERATURE:	
Temperature monitoring range	+20/+120 F
Output Signal	4-20 MA DC
Installation adjustments	none required
Calibration adjustments	zero & span
Factory calibration point	70° F
Accuracy at calibration point	
Platinum RTD element	±1 F
Sensor	±1.2 F
Dimensions	
Sensor probe length	12" - 48"L
Overall size	4"H x 2.125"W x PH"L
e. OUTSIDE AIR TEMPERATURE:	
Temperature monitoring range	-50/+122 F
Output Signal	4-20 mADc
Factory calibration point	70° F
Accuracy at calibration point	
Platinum RTD element	±0.1 F
Sensor	±0.1 F
Dimensions	8"L x 1.25"H x 1.44"D
f. RELATIVE HUMIDITY:	
Sensor (General Eastern)	
Humidity range	0 to 99%
Operating temperature	15 F to +170 F
Accuracy	±2% RH 20-95% RH
Sensing element	Capacitive sensor
Transmitter	
Output signal	4-20 MA DC
Installation adjustments	zero & span

Operating temperature	15 F to +170 F
Voltage requirement	12-36 VDC nominal
Dimensions	
Room mounted housing, incl.	
Sensing element	2.15"W x 3.15"H x 1.63"D
Duct Transmitter	4"L x 4" W
Probe length	1.125"OD x 9"L

g. CARBON DIOXIDE - DT Sampling:

Type	Non-Dispersive - Infrared (NDIR)
Range	0-2000 ppm
Drift	±100 ppm
Accuracy	±5% or 75 ppm
Repeat ability	±20 ppm
Operating Temp	0° to 50° C
Minimum Calibration Interval	2 year
Analog Output (linear)	0-10 vdc or 4-20 ma
Warranty	7 years parts & labor
Manufacturer	Air Pro Systems DCS-301, Siemens, Direct Industry, ELT
Sensor or approved equal	

2.06 MONITOR AND CONTROL POINTS

- A. Provide all analog and digital sensors and control devices as specified. The installation of such devices and sensors shall be the responsibility of the Subcontractor. Subcontractor shall also provide all required auxiliary contacts, relays, transformers, transducers, resistors, etc. to perform the monitoring of control functions specified. Sensors and their connections shall be electronic or electric.
- B. Where devices are not specified to be under direct digital control, provide all local controls to effect the sequence of operation specified.
- C. All sensors and control points located in equipment casings shall be accessible for repairs, maintenance or replacement from outside of the casing. Provide suitable supports for all sensors and devices.
- D. Location of all sensors and control points subject to Commissioner approval. Where sensors or devices are exposed to damage provide a sheet metal protective enclosure with appropriate label.
- E. Where, due to the size of the damper or coil, multiple damper operators or control valves are specified, the control for these combination of actuators and valve operators shall be specified as one control point. The subcontractor shall provide all wiring, tubing, and relays to operate these control devices as one unit.
- F. Monitor Points:
 - 1. Temperature (Analog Input):

- a. Chilled and Hot Water: Sensors installed in supply and return mains as shown.
 - b. Space Temperature: Sensor installed in wall-mounted tamperproof enclosure with locking covers. Since aesthetics are of the highest concern with all visible elements, sensor enclosure must be kept as unobtrusive as possible. All enclosures are subject to approval of the Commissioner, submit samples.
 - c. Return Air Temperature: Upstream of outside air connection.
 - d. Mixed Air Temperature: Provide averaging type sensor.
 - e. Coil Discharge: Downstream of coil in unit casing. Where coils are installed within the same unit casing and distance between coils is minimal, use averaging type sensors mounted off coil face.
 - f. Outside Temperature: Provide rainproof enclosure and solar shielding. Sensor to be located on roof or on side of bulkhead. Submit locations for approval by Commissioner.
2. Relative Humidity (Analog Input):
- a. Outside Relative Humidity: Provide rainproof enclosure and solar shielding. Sensor to be located on roof or on side of bulkhead. Submit location for approval by Commissioner.
 - b. Space Relative Humidity: Sensor installed in wall-mounted tamper proof enclosure. Since aesthetics are of the highest concern with all visible elements, sensor enclosures must be kept as unobtrusive as possible. All enclosures are subject to approval of the Commissioner, submit samples.
3. Fan Status (Analog Input):
- a. Provide current transducer (CT) for each fan to indicate Fan motor load. Calibrate CT with software to indicate normal operation, broken belt, overload.
 - b. CT shall also be used to sense "single phasing" power failure and automatically shutdown-affected fan.
 - c. (Digital Point) Where indicated provide differential pressure switch across the fan.
 - d. For cooling towers prove CT.
4. Exhaust Fans Status (Digital Input):
- a. Duct or Plenum Mounted Fans: Provide differential pressure switch across fans.
 - b. Mushroom Type Fan: Provide sail switch in ductwork upstream of fan.
 - c. Provide auxiliary contacts and relays to monitor fan starter status to determine if fan is required to be on.
5. Pump Status (Digital Input):
- a. Provide differential pressure switch across pump to prove flow.
6. Filter Alarm (Analog Input):
- a. Provide differential pressure sensor with sensing element across each filter in the filter bank and gaseous purification modules. This shall include an individual sensor across the prefilter and one across the final filter. Indication shall be by means of software as differential pressure rises above a preset adjustable setpoint. Utilize variable capacitance sensor with 4-20 MA transmitter. Accuracy including non-linearity hysteresis, and non-repeatability is within 1% of full scale
7. Contact Closure (Digital Input):
- a. Provide control relays and auxiliary contacts to monitor the following:
 - b. Equipment status or summary alarm.
 - c. Operating mode and ready - applies to status of chiller/heaters.

- d. Freezestat.
 - e. Damper end switch. For each air handling system, damper end switches shall be annunciated at a local panel. A summary alarm for each shall be annunciated at the BAS.
8. Fire Alarm Panel (Digital Input):
- a. Provide control relays and auxiliary contacts to monitor the following:
 - b. Fan Shut Down Signal: Input from the Fire Alarm Control Panel (FACP) shall cause all air-handling units and exhaust fans to shut down.
 - c. Fire Alarm Reset: Input signal from fire alarm panel indicating that fire alarm situation has been cleared.
9. Pressure Sensor (Analog Input):
- a. Provide pressure sensor in piping.
10. Carbon Dioxide Sensor (Analog Input):
- a. Provide carbon dioxide sensor in a outside air duct and return air duct mains upstream of mixed air plenum.
11. Static Pressure (Analog):
- a. Utilize a variable capacitance sensor, in which pressure changes acting on a diaphragm create equivalent changes in electrical capacitance. This proportional change is electronically detected and converted to a 4-20 mA output on a two-wire circuit equipped with external power of 15 to 30 Vdc. Transmitter accuracy, including non-linearity, steresis, and non-repeatability, is within 1A% of full scale.
 - b. Locate static pressure two thirds of the way the down duct mains. Use ceiling plenum as reference pressure.
- G. Control Points:
1. Start/Stop or Enable/Disable (Digital Output Point):
- a. Start/Stop relay module shall contain two (2) single pole, double-throw relays for start/stop functions at the remote point, with both relays mounted on a circuit board and factory wired to numbered terminal strips.
 - b. Where multiple relays are required for a single start/stop point, Subcontractor shall furnish and install all relays and necessary controls interface.
 - c. Where an Enable/Disable point is called for, connect to equipment controls to maintain all normal start up and shut down sequences, interlocks, and safeties.
2. Damper Control-Modulating (Analog Output):
- a. DCP shall be in direct digital control of damper positions to effect the specified sequences of operation.
 - b. Outside air dampers on units with CO₂ sensors in the return air shall be of the modulating type.
3. Damper Control - 2 Position (Digital Output):
- a. DCP shall be in direct digital control of minimum outside return air or make up air dampers.
4. Control Valve - Modulating (Analog Output):
- a. DCP shall be in direct digital control of heating and cooling, control valves to effect the specified sequence of operation.
5. Control Valve - 2 Position (Digital Output):

- a. DCP shall be in direct digital control of valve position.
6. Control Mode Selector (Digital Output):
 - a. DCP shall be in direct digital control of selector switch to index equipment to various modes of operation. See Sequence of Operation.
7. Speed Control (Analog Output):
 - a. DCP shall be in direct digital control of all variable speed drives included in these drawings and specifications.
8. Speed Control (High Level Interface):
 - a. DCP shall communicate directly with all variable speed drives included in these drawing and specifications.
 - b. The BAS shall be able to interface with all control, monitoring, alarm, and maintenance software functions provided with the VFD.
 - c. Provide required interface protocols and software drivers.
9. Reset Signal (Analog Output):
 - a. DCP shall send output signal to reset port of equipment control panel.
 - b. Reset shall include chilled water temperature.
 - c. BAS subcontractor shall coordinate with equipment manufacturer as to the proper reset signal (4-20 ma, 0-10 vdc, etc).
10. Reset and Monitoring (High Level Interface):
 - a. DCP shall communicate directly with equipment identified below:
 - 1) Boiler
 - 2) Rooftop Units
 - 3) Computer Room Units
 - 4) VRF System
 - b. The BAS shall be able to interface with all control, monitoring, alarm, and maintenance software functions provided with the equipment.
 - c. Provide required interface protocols and software drivers.

2.07 SOFTWARE

- A. Provide resident memory operation system.
- B. The operating system shall require no operator interaction to initialize and commerce operations. The program shall provide operation and management of all devices and error detection and recovery from arithmetic and logical faults. Software shall allow user development and alterations of the programs. The system shall self-test and report problems. Each point shall be given an identification of up to 8 characters.
- C. System shall be configured to provide the following:
 1. Add and delete points, inventory list, maintenance and work orders without software regeneration.
 2. Annunciate alarms in order of priority at the on site and off site terminal and front-end computer. The Subcontractor shall work with the City of New York to establish to establish alarm setpoints and reporting priorities.
 3. Modify any point or program parameter.
 4. Change, add or delete English language descriptors.

5. Change, add or delete engineering units.
 6. Change, add or delete points in start/stop programs, trend logs, etc.
 7. Select analog alarm limits.
 8. Characterize each function card to accept different analog inputs, pulsed or steady state digital signals.
 9. Adjust analog differentials.
 10. Create custom relationships between points. A general purpose user language shall be provided, such that the user can implement software interlocks, control algorithms, and calculations.
- D. Software shall comply with current ASHRAE *BACnet* standard and *Lonmark* protocols for compatibility and connectivity to multiple vendor equipment.
- E. Summary Requests of Selected Systems and/or Points:
1. Alarm Summary: Provides a summary of the location or system description and value of points which are in alarm at the time the log is requested or at pre-programmed times.
 2. Status Summary: Provides a summary of the location and operating status of all controlled equipment.
 3. Analog Summary: provides a summary of the location and present value of all analog sensors.
 4. Single Group: Provides a summary of the current status of each point associated with a single group.
 5. All Point: Provides a summary of the status of all points in the system.
 6. Trend: Provides a periodic printout of any 500 points randomly selected addresses on a variable trend interval to allow operator diagnosis of system performance on a time-increment basis. All points printed in continuous columns across paper with a trend interval of 1-60 minutes. System shall be capable of trending up to 200 parameters over a 7-day period of time, with a change of value of once per minute.
 7. Totalizing of Equipment Running Time: Provides elapsed running time on selected equipment and periodically prints total running time in minutes and hours. Provisions for alarming at predetermined total shall be incorporated.
- F. Provide at least four levels of password protection. The lower level shall prevent the operator from changing any control action or modifying any programs.
- G. Provide software to support system dynamic color graphics and data display. Create all symbols and graphic files to provide fully labeled system schematic graphics for ALL mechanical system monitored or controlled by the BAS. For each system graphic provide the following:
1. Adjacent to each monitor and control point indicated on the system schematic, show real time reading, current setpoint, high limit alarm setpoint, and low limit alarm setpoint.
 2. Provide "Operator Diagnostics" keyed to high and low limits to indicate possible reasons why system is operating out of specified performance range. For example - If cooling coil discharge temperature is higher than setpoint with chilled water control valve fully opened; possible diagnostic might say "Check coil for chilled water flow, open manual shut off valves."
 3. Provide a pull down window indicating the text of the approved sequence of operation for that system.
- H. Provide symbol library and mouse driven software to allow generation of user defined graphics.
- I. Provide licensing for all programming. Licensing shall allow the use of additional on and off site computer terminals for system monitoring or control.

- J. During warranty period provide all software updates at no additional cost.

2.08 PROGRAMMING AND APPLICATION PROGRAMS

- A. Provide programming as required to fulfill the intent of this specification and for all applications programs specified herein. Application programs shall include all features normally associated with such programs and any special features specified. Application program shall provide control features in addition to those specified as part of the Sequence of Operation. Equipment to be included under the control of application programs will be identified in the Point List. Where no points are indicated in the drawings or specifications to be included in a particular program, provide software programming for future points connections.
- B. Programs shall include the following:
1. Schedule start/stop program.
 2. Optimized start time/warm up/cool down cycle program.
 3. Day/night setback program (where applicable).
 4. Equipment operation equalization.
 5. Hot water reset.
 6. Geothermal water temperature reset.
 7. Supply air temperature reset program.
 8. Automatic temperature control (direct digital control).
 9. Power Failure Restart.
 10. Run time totalization and reporting.
- C. For points so indicated on the points list, set "high" and "low" alarm limit setpoints.

2.09 MULTIBLADE DAMPERS AND CONTROLS

- A. General:
1. Multiblade damper shown on the drawings in connection with outside air intake, exhaust air discharge, and air recirculation of the fan systems shall be the product of the manufacturer of the temperature control equipment.
- B. Construction of Multiblade Dampers:
1. Frames: Frames shall be of steel, 1/8" thick channel shape or 1/4" thick flat bar. They shall be braced for rigid reinforcement. Frames shall be provided with boltholes for mounting and with stationary stops on the four sides to prevent air leakage.
 2. Blades: Damper blades shall not be wider than 10", shall have formed interlocking edges, and shall have a 1/2" deep "V" pressed in the center to stiffen the blades. Open position of the blades shall be limited to 90 degrees. Damper blades for fan systems shall be not lighter than No. 16 gauge galvanized sheet steel. Unless shown otherwise on the drawing, damper blades for supply systems shall be of the opposed blade type, and those for exhaust systems shall be parallel type.
 3. Bearings: Bearings on blade pivot points shall be fitted with stainless steel or non-ferrous metal sleeve (or ferrule type) pressed into damper frame. Bearings shall be accurately sized to fit blade axles, and shall provide smooth operation.
 4. Linkage: Linkage or tie rod to interconnect blades shall be of non-ferrous metal and shall be secured to the blade lugs by means of cotter pins and washers.
- C. Dampers shall be manufactured by Ruskin or approved equal.

2.10 AUTOMATIC VALVES

- A. All automatic valves for low-pressure service (under 125 psi) are to be constructed of high grade bronze for valves 2" IPS and smaller, and cast iron for valves in excess of 2" IPS.
- B. Automatic valves up to 2-1/2" IPS are to have screwed globe bodies; valves in excess of 2-1/2" are to have flanged bodies. All valves to have bronze trim, stainless steel with self-adjusting Teflon packing.
- C. Water valve to be sized on the basis of 2 psi pressure drop unless otherwise indicated.
- D. Automatic control valves to be fully proportioning with modulating plug or V-port inner valves unless specified otherwise. Valves to be quiet in operation and fail-safe in either normally or open normally closed position in the event of control air failure.
 - 1. (1) All valves capable of operating at varying rates of speed to correspond to the exact dictates of the controller and variable load requirements, and capable of operating in sequence when required by the sequence of operation. All control valves to be sized by the control manufacturer and guaranteed to meet the heating and cooling loads as scheduled. All control valves to be suitable for the pressure conditions and close against the differential pressure involved. Valve operators to be of the molded synthetic rubber diaphragm type. Body pressure rating and connection type construction suitable for the service.
- E. For all coils, no control valve shall be larger than 3" unless otherwise indicated. Where larger valves are required, provide two (2) in parallel. For multiple steam valves size for one-thirds sequenced operation.
- F. Cold water valves, throttling type and bypass valves to have linear flow characteristics. Valves to be single seated type, except where pressure and flow combination exceeds rating for commercial valve operators, double seated valves may be used.

2.11 ELECTRICAL WIRING

- A. Provide all control wiring under this Section regardless of voltage.
 - 1. (1) All control wiring shall be installed under the direct control and supervision of the ATC/BAS subcontractor. Provide wiring for all control devices specified herein, shown on drawings, or supplied with specified mechanical equipment.
- B. Provide interlock wiring.
- C. Provide all other wiring required for the complete operation of the specified systems including required transformers.

Wire DCP, front-end PC and printer, and any transformers or controls to emergency power system.
- D. Run ALL control wiring in conduit. Conduit shall comply with the requirements of the Electrical Specification.

2.12 WIRE AND CABLE

- A. Wire and cable connection for the system shall be as follows:
 - 1. Communications cable shall be 20 AWG minimum, twisted and shielded in pairs, with shielding grounded.
 - 2. Coaxial cable shall be used if recommended by the manufacturer.

3. Control wiring and sensor wiring shall be 22 AWG minimum with 600-volt insulation, shielded 2 or 3 wires, as recommended by the manufacturer.

2.13 ELECTRICAL ACTUATORS

- A. All control valve and damper actuators shall be electronic.
- B. Actuators shall sufficient torque to properly stroke valve or damper in all modes of operation.
- C. For automatic dampers provide as a minimum one (1) actuator for every 20 square feet of damper.
- D. Actuators shall be manufactured by Belimo or approved equal.

2.14 LOCAL CONTROL PANELS

- A. Provide adjacent to each air conditioning system, heating and ventilating system, water system and other mechanical systems not under microprocessor control, a local enclosed control panel of the steel cabinet type. Panel to meet with NEMA 1 requirements with proper bracing for rigid wall or floor mounting. Mount in this panel all associated temperature controls, time clock, transmitters, thermometers, relays, accessories, etc. for the electrical control and alarm functions of the system.
- B. Mark each control devices on the panel with nameplates describing its function and cross-referencing it to control diagrams. Provide system flow diagram on face of panel. Panel to have a hinged locked door. Mount controllers and relays internally to minimize unauthorized tampering. Identify all items mounted on or within local control panels by means of 1" X 3" black bakelite nameplates with white lettering.

PART 3.00 - EXECUTION

3.01. INSTALLATION

- A. Install the system as recommended by the manufacturer, using only equipment recommended or acceptable to the manufacturer.
- B. Comply with the New York City Electrical Code for electrical work. Run all wiring in conduit. Run all wiring in finished spaces concealed. All equipment located outside shall be in suitable weather tight enclosure.
- C. Install all conduit, wiring, and cable, and install all equipment in first-class manner, using proper tools, equipment, hangers, and supports, and in locations as required for a neat, attractive installation. No material shall be exposed if it is possible to conceal it. Exposed materials shall be installed only with consent of the engineer.
- D. Support all sensors as recommended by the manufacturer where inside equipment such as ductwork. Sensors in the space shall be in small, attractive housings designed for that purpose and mounted on an electrical junction box.

3.02. SOFTWARE

- A. Load and debug the software to provide a complete operating BAS system, and operate the system to prove function of each system. Where necessary, the sensors shall be heated or cooled to demonstrate the correct function.
- B. The subcontractor shall review the program with the Commissioner in the programming stage to make sure that the programmer understands the engineer's intent and the program will carry out that intent.
- C. Provide the Commissioner with a bound copy of the complete programming including flow charts and logic diagrams, annotated code, and all programming "tricks" as well as instruction books on reprogramming of the system for future modifications of the system, if desirable.
- D. Provide six bound copies of complete information on the equipment and all components, including programming, for the City of New York's use and records.
- E. The subcontractor shall monitor the system monthly for one year to verify performance of the system. A written report shall be provided to the City of New York indicating the state of calibration of all sensors, evaluation of the operation of the application programs and evaluations of whether user defined setpoints are in line with application program intent. A list of suggestions for improving user operation of the system including the need for additional training shall be provided.

3.03. FIELD TESTS AND ACCEPTANCE

- A. The Subcontractor shall provide the services of both a control system serviceman and a fully qualified building automation control technician who, in the presence of a representative of the City of New York and Commissioner will perform the tests. Tests will be witnessed after the Subcontractor is satisfied that the system has been adjusted and is operating in accordance with the Specification requirements. The City of New York may elect to hire an independent testing agent to verify all tests with their own recording and test instruments. This Subcontractor must coordinate the testing work and work in a timely fashion with the independent testing agent.
- B. All test instruments required shall be furnished by the Subcontractor. Submit list and descriptions for approval prior to performance of tests.
 - 1. Instrument Accuracy:
 - a. Temperature: $\pm 0.1^{\circ} \text{F}$ or 1% of full scale, whichever is less.
 - b. Humidity: $\pm 5\%$ (precision calibrated sensor).
- C. Prior to testing, the Subcontractor shall submit for approval by the Commissioner detailed test procedures which shall be used to test each point. Approval of the Commissioner shall be required before testing can begin.
- D. A certified report listing the points that have been tested and stating that these points are operating within an acceptable range of values shall be submitted to the Commissioner prior to system acceptance.
- E. Test Procedure:
 - 1. After the Subcontractor has tested and adjusted each system and subsystem in turn, checking each of the points listed, he, in the presence of a representative of the City of New York, and Commissioner shall retest each point as required.
 - 2. The Subcontractor's console operator shall maintain a set of test data sheets, with a duplicate set maintained by field test personnel. Readings and other test results at the console and in

the field to be recorded independently, with figures not compared until after completion of the subsystem test, when the results are to be combined. Console operator to log all test data possible on the printer. When setpoints are reset, or mode is changed to be recorded only after conditions have stabilized.

3. Temperature, Pressure, Humidity Indication: Field measure values with test instruments; local instrument (if any) and remote display at console. Log on printer and record on respective data sheets.
 4. Analog Limit Alarms: At the console, raise the low limit to a point above the actual measured reading in the field. Alarm should report in and be logged in on the printer. For high limit, lower the setpoint. Record on data sheets the field measured conditions and the logged readings.
 5. Setpoint Reset: In field, measure condition of controlled medium with test instrument. Read corresponding value at console and read branch signal output with test instrument. Branch signal should be in same proportion of its full range as the measured medium reading is to the throttling range of the controller. Resetting the control point at the console should result in a proportionate change in branch signal.
 6. Contact Indication and Alarm:
 - a. For subsystems simulate actual function or operation in field. Jump contacts where simulation is not practical.
 - b. High or Low Limit Temperature Sensors: Simulate required limit temperature by immersing sensor in liquid of proper temperature (or other practical means). Alarm should report in at console. Repeat tests with high limit setting reduced and low limit setting increased by 5 degrees F; alarm should not report in at console. Record all observations.
 7. Pressure Differential at Filters: Impress artificial pressure on high-pressure connection to simulate design differential pressure limit condition. When limiting differential pressure is reached, alarm should report in at console. Record differential pressures read at field test instrument gauge and compare with limit setting.
 8. Mode Change: Change mode setting at console and observe change of controlled element in field.
 9. Proving Devices: Operate related systems to activate devices and compare specified resultant function or operation.
- F. Upon receipt of a punch list from the Commissioner an installation inspection report shall be prepared by the Subcontractor showing, by system, each outstanding item on the punch list. After all items appearing on the installation inspection report are completed, a second written request for system approval shall be made. As each or all items are approved, an appropriate notation shall be entered at the time of joint inspection on the system report.
- G. System Modifications and Adjustments:
1. The Subcontractor shall modify, alter, add or remove hardware or software programs, or related accessories for the purpose of eliminating punch list items and achieving specified performance, as required until such time acceptable performance of the building automation system has been established. Modifications to and testing of software and programming shall be done off-line until it is deemed ready for online operation and testing.
 2. The Subcontractor shall adjust and modify software programs and control setpoints, as required until such time such that space temperature, humidity, pressure, etc. setpoints are met on a consistent basis. The setpoints specified herein shall be used as "starting points" for the initial set up of the BAS and automatic temperature control system. The Subcontractor shall

- be responsible for using the automatic capabilities of the BAS to adjust and reset setpoints as required.
3. Where it is required for the Subcontractor to modify, alter, add or remove hardware or software, or related accessories as specified above, shop drawings, training manuals, points lists and other submittal data shall be revised to reflect these changes.
 4. There may be times when the sensor location indicating on the drawings doesn't provide an effective measure of what is happening within the system or space. The Subcontractor shall be prepared to relocate such sensors (up to INDICATE NUMBER OF SENSORS sensors) without cost to the City of New York.
- H. The City of New York will accept hardware and software only after system functions have been successfully demonstrate under all modes of operation. This included operating through a summer and winter. Vendor shall be responsible for system operation during trial operating period.
- I. The report shall indicate that the design conditions have been maintained ($\pm 1^{\circ}$ F and $\pm 3\%$ RH) for 66% of the time, and that design conditions have been maintained ($\pm 2.0^{\circ}$ F and $\pm 5\%$ RH) for 90% of the time. In the event that this criteria is not achieved, a subsequent thirty day testing and calibration period shall be initiated. The subcontractor shall present the data in a spreadsheet format indicating the temperature, humidity, and deviation from setpoint for each hour using trend log data. As summary calculation should be included to indicated that the testing criteria has been met for each parameter over the trended hours.
- J. In the event that the subcontractor fails to achieve the required performance criteria, he shall prepare a report indicating corrective measures to be taken. At no cost to the City of New York, the subcontractor shall incorporate these changes in the system. If in the opinion of the subcontractor the performance criteria can not be achieved due to problems unrelated to the control system, the report shall identify those problems and suggest corrective measures.

3.04. GUARANTEE SERVICE

- A. The Subcontractor shall perform complete guarantee service of the Automatic Temperature Control System for a period of one calendar year, at no additional cost to the City of New York, commencing with the date when the system is accepted so that the said controls may be operated 24 hours a day, 7 days a week. The guarantee service program shall be performed with all reasonable care to keep the control and system in proper, safe and efficient operating condition. The Subcontractor shall furnish all labor, materials, programming software updates, supplies, parts, equipment, other safety devices and all other things necessary or proper for or incidental to such guarantee service.
- B. The Subcontractor shall repair, replace and re-program as soon as possible, any part or parts of the controls and system which become unsuitable for continued use. The heating, ventilating and air conditioning control guarantee service performed by the Subcontractor shall include but not be limited to the following:
1. Monthly and systematically examine, adjust, calibrate and clean all sensor, temperature controls, pressure controls, valves, relays, motors and accessories.
 2. Monthly and systematically furnish lubricants and lubricate such components as valve packing glands, damper bearings, linkages and switches pertaining to the control packages.
 3. Replace valve packing materials of control valves as often as may be necessary in order to maintain the valves without leakage.
 4. Update all software and correct all "bug". Modify presentation graphics based on City of New York's operating experience.

- C. The Subcontractor shall submit to the City of New York a detailed record of all servicing performed under this Contract and shall notify the City of New York if during the performance of services, additional repairs or replacements have to be scheduled.

3.05. SEQUENCE OF OPERATION

Provide all controls (BAS or local as specified) to accomplish the sequence of operation as specified.

A. Alarm Limits and Critical Alarms:

1. For points so designated on the points list, program "high" and "low" limits.
2. Monitor points and alarm deemed as "critical" by the City of New York's operators shall be automatically annunciated on the color graphic display and an alarm report generated.
3. When setpoints are critically out of range or critical alarms occur, a unique twenty-five word alarm message shall be generated instructing security personnel in a course of action.
4. All critical alarms must be acknowledged via password and a message printed and stored in an alarm file. The alarm file shall maintain information relating to the last one hundred alarms.
5. Up to fifty "50" points may be designated as critical.

B. Freezestats:

1. Provide for all air handling, an electric freezestat of the manual reset type to shut down the unit whenever the temperature falls below its setting, 40°F (adjustable). The BAS shall annunciate any air handler unit shut down due to a freezestat.

3.06. CONTROL ALGORITHMS AND SETPOINTS

- A. The Subcontractor shall develop the actual operating algorithms and sequences required to perform the control sequences specified. The subcontractor shall develop all software and programming to provide a control loop (loops) with the required amount of "gain" necessary to meet the close temperature and humidity tolerances required.
- B. Controls algorithms shall be created to minimize simultaneous heating and cooling except as required for dehumidification.
- C. The sequences of operation indicated below are written in terms "cause and effect" and imply the use of proportional control strategies. It shall be the responsibility of the Subcontractor to select from among the various BAS capabilities of PID control, "fuzzy logic", historical trending, etc. to select the appropriate strategy to provide a responsive as well as stable control sequence.
- D. The setpoints specified herein shall be used as "starting points" for the initial set up of the BAS and automatic temperature control system. The Subcontractor shall be responsible for using the automatic capabilities of the BAS to adjust the reset setpoints as required such that space temperature, humidity, pressure, etc. setpoints are met on a consistent basis.

3.07. FAN SHUT DOWN & SMOKE PURGE

- A. Install smoke detectors (provided by electrical subcontractor) in main supply duct and return duct or plenum of all air handling systems greater than 2000 cfm. Supply duct detector shall be located downstream of filters and ahead of any branch connections. Return duct or plenum detector shall be located upstream of filters, exhaust connections and outdoor air connections. Signal from the building fire alarm system will automatically shut down fans and close all associated combination fire/smoke

dampers. The Mechanical Subcontractor shall provide terminals for the termination of the fire alarm signal for fan shutdown. Signal, interlock wiring, power wiring and final connections will be provided by electrical subcontractor. The interface with the fire alarm system shall be shown on the ATC wiring diagrams.

- B. The ATC/BAS system will receive a signal from the fire alarm system when the fire alarm system is in alarm. Upon receiving a fire alarm reset or all clear signal from the fire alarm system, a System Restart Program shall be initiated. This program shall provide a text prompt to the system operator requesting whether he would like to start each system individually. If he wishes to start them individually, each system shall be listed with a text prompt to manually restart each air-handling units, fan coils, and exhaust fan that was shut down. If he wish to start them all he shall manually initiate a Group Restart Command and then each air-handling units, fan coils, and exhaust fan shall be started under the Power Failure Restart program to avoid unnecessary peak demand.
- C. Provide interface with kitchen fire extinguishing system control panel to shut down kitchen supply air systems; kitchen exhaust fan shall continue to operate. Provide confining dampers (or combination fire/smoke damper) (N.C.) in kitchen exhaust ducts which do not serve cooking hoods (general exhaust, dishwashers etc.) which shall be interlocked with kitchen hood systems to close upon command from kitchen fire extinguishing system control panel.
- D. Provide end switches for all automatic dampers to prevent fan operation when dampers are not fully open.
- E. For each air conditioning or air handling system (supply, return and exhaust) provide an Emergency Shut-Down Switch tied to the B.A.S. Location shall be as indicated on plans or as approved by Commissioner. If location is not shown on plans, locate switch near exit of mechanical room. Where there is more than one unit in the mechanical room, a single switch shall be used to shut down all systems.

3.08. OUTSIDE AIR UNIT WITH HEAT RECOVERY

- A. The system shall be interlocked through software started and stopped by the BAS based on an occupancy schedule.
 - 1. With the SYSTEM indexed to OFF, the supply fan and exhaust fan shall be off, and the outside air damper and return air dampers shall be closed. In the event of a power failure, controls shall return to their OFF position.
 - 2. With the SYSTEM indexed to ON, the following shall occur in sequence.
 - a. The outside air damper and return air damper shall open and a damper end switch shall prove that the damper is fully open before the sequence of operation resumes.
 - b. The supply fan and exhaust fan shall start. The fan's VFD shall slowly ramp up the fan to its maximum speed.
 - 3. The exhaust fan shall run at a constant volume as set by the balancer to provide a constant exhaust.
 - 4. The Supply fan shall modulate through the BMS based on a pressure sensor locate in the ductwork above the captains office. Each zone shall be provided with a Co2 sensors. The CO2 sensor shall through the BMS modulate closed the outside air damper in its associated zone and the outside air duct shall close down to 25% of its designed capacity when it senses that the space is not occupied. On an increase in pressure, as sensed by the pressure sensor, the VFD through the BMS shall slow down to maintain set point (.5"Sp). On a decrees in pressure the VFD through the BMS shall increase in speed.

- B. The sequence of controls for the units shall maintain the condition of the unit leaving air within a dead range as defined as follows:
1. The BAS shall modulate the gas fired furnace and split air cooled condenser in sequence to maintain a discharge temperature. There shall be a 5F degree dead band between heating and cooling modes of operation.
 2. The unit shall reset the discharge air temperature set point based on outside air temperature from 55F to 72F.
 3. Indexed heating mode, the BMS shall modulate the gas fired furnace to maintain the supply air temperature set point. As the discharge temperature drop below set point, the BMS shall modulate up the gas fired furnace. On a rise in discharge temperature the BMS shall modulate the furnace down. The air cooled condenser shall remain off when indexed to heating mode.
 4. Indexed to cooling, The BMS shall stage the air cooled condenser's compressors to maintain the supply air set point. As the discharge temperature drop below set point, the BMS shall stage off compressors. On a rise in discharge temperature the BMS shall stage on compressors. The Gas fired furnace shall remain off when indexed to cooling mode.
- C. An electric freeze stat of the manual reset type shall shut down the unit whenever the supply air temperature drops below 35 FDB (adjustable).
- D. The BMS shall be capable of monitoring the following points:
1. Unit mode of operation: Heating /Cooling
 2. Outside, supply, return and exhaust air temperature and humidity
 3. Supply and exhaust fan speed (VFD) input and actual speed
 4. Damper status
 5. Duct static pressure
 6. Dead band and change over set points (heating and cooling)
 7. Compressor status
 8. Temperature and humidity
 9. System operating energy load
 10. Trending overlays on all of the above.
- E. The BMS shall be provided with the following alarms:
1. Fan Failure (supply and exhaust)
 2. Hi/low static Pressure
 3. Compressor failure

3.09. ZONE OUTSIDE AIR

- A. Each zone served by the roof top make up air unit shall be provided with a CO2 sensor and modulating damper. The CO2 sensor through the BMS shall modulate the zone outside air damper to maintain a maximum CO2 level of 700 PPM for its respective zone. On a rise above this level, the zone damper shall modulate open. On a drop below setpoint the zone damper shall close.

- B. The BMS shall monitor the CO2 levels and damper position in each room.
- C. The BMS shall alarm at the BMS on CO2 levels above 1000 PPM.

3.10. H&V UNIT WITH HEAT RECOVERY

A. The system shall be interlocked through software started and stopped by the BAS based on an occupancy schedule.

1. With the SYSTEM indexed to OFF, the supply fan and exhaust fan shall be off, and the outside air damper and return air dampers shall be closed. In the event of a power failure, controls shall return to their OFF position.
2. With the SYSTEM indexed to ON, the following shall occur in sequence.
 - a. The outside air damper and return air damper shall open and a damper end switch shall prove that the damper is fully open before the sequence of operation resumes.
 - b. The supply fan and exhaust fan shall start. The fan's VFD shall slowly ramp up the fan to its maximum speed.
3. The exhaust fan shall run at a constant volume as set by the balancer to provide a constant exhaust.
4. The Supply fan shall modulate through the BMS based on a pressure sensor located in the ductwork above the captains office. Each zone shall be provided with a CO2 sensor. The CO2 sensor shall through the BMS modulate closed the outside air damper in its associated zone and the outside air duct shall close down to 25% of its designed capacity when it senses that the space is not occupied. On an increase in pressure, as sensed by the pressure sensor, the VFD through the BMS shall slow down to maintain set point (.5"Sp). On a decrease in pressure the VFD through the BMS shall increase in speed.

B. The sequence of controls for the units shall maintain the condition of the unit leaving air within a dead range as defined as follows:

5. The BAS shall modulate the Hot water control valve to maintain a discharge temperature.
6. The unit shall reset the discharge air temperature set point based on outside air temperature from 63F to 72F.
7. Indexed heating mode, the BMS shall modulate the hot water control valve to maintain the supply air temperature set point. As the discharge temperature drop below set point, the BMS shall modulate up the control valve. On a rise in discharge temperature the BMS shall modulate the control valve down.
8. Whenever the outside air temperature is below 38F, the unit freeze pump shall start and run continually.

C. An electric freeze stat of the manual reset type shall shut down the unit whenever the supply air temperature drops below 35 FDB (adjustable).

D. The BMS shall be capable of monitoring the following points:

1. Unit mode of operation: Heating
2. Outside, supply, return and exhaust air temperature and humidity
3. Supply and exhaust fan speed (VFD) input and actual speed
4. Damper status

5. Duct static pressure
 6. Temperature and humidity
 8. System operating energy load
 9. Trending overlays on all of the above.
- E. The BMS shall be provided with the following alarms:
1. Fan Failure (supply and exhaust)
 2. Hi/low static Pressure

3.11. HOT WATER SYSTEM-BOILERS WITH PRIMARY/SECONDARY PUMPS

- A. Install controls specified with boilers. The boiler manufacturer shall provide a BACnet interface for connection the building BMS system.
- B. The boilers shall be enabled and disabled manually through the BAS. The boilers shall fire based on their own operating controls to maintain a primary loop water temperature of 160 degrees F. The BAS shall reset the loop water temperature down to a minimum (140 degrees) based on load.
- C. The local boiler circulation pump (provided by the boiler manufacture) shall be controlled through the boiler controller. On a call to fire, the pump shall start and shall run until the boiler controller signals it to stop.
- D. The boilers shall be connected the domestic hot water storage tanks. On a call for domestic hot water through the boiler control panel, the boiler shall be enabled and the associated DHW pump shall start. Once tank set point has been reached, the boilers shall go back to their prior mode of operation.
1. The DHW tanks shall be connected to the solar hot water system when operating and producing water above set point, the boiler DHW sequence shall be disabled through the BMS. If at any time the tank water temperature drops below 130F, the boiler DHW sequence shall be enabled.
- E. System Pumps
1. A differential pressure sensor installed across the Hot Water supply and return lines will be used by the BMS to control the lead pump speed to maintain a Differential Pressure setpoint. When the lead pump is operating at a speed greater than 90%, the lag HW pump will be enabled. The BMS will synchronize the two pumps and reset their speeds to a lower speed as needed to maintain system differential pressure. If the pumps drop to within 5% of minimum speed, the BMS will disable the lag pump and continue to maintain pressure using only the lead pump.
 2. Equipment rotation methods will be adjustable from the BMS. Rotation can be set manually by the operator, based on equipment runtime, or weekly rotation. With runtime rotations, the equipment with the least number of run hours will be established as the lead unit to be called. The remaining assets will be set in numerical order from the lead unit. With weekly rotations, the BMS will rotate equipment in numerical order once a week (Monday at 4 pm). Under manual rotation, the operator will be able to set the rotation order from the BMS. If any unit is not available due to failure, the BMS will remove the unit from rotation and call the next available unit in order of rotation. If the called unit becomes unavailable and another

unit is available and not called, BMS will switch the equipment by shutting off the unavailable unit and calling the available one. If the called unit becomes unavailable and no other equipment is available and is not already being called, the BMS will continue to call for the unavailable unit to run.

3. If the pump is running at its minimum speed, the differential pressure bypass control valve will modulate to bypass supply water to the return as system pressure builds up due to hot water control valves closing.

F. Breakglass Stations:

1. Provide breakglass station the entrance to the boiler room.
2. Upon activation the breakglass station controls shall enact an orderly shutdown of all boilers and annunciate an alarm.

3.12. EXHAUST FANS

A. General Exhaust Fan:

1. The general exhaust fan shall be started and stopped based on an occupancy schedule. When the fan is started its motorized damper shall be opened.
2. The BMS shall monitor the damper positions and fan status.
3. The BMS shall alarm on fan failure or incorrect damper position.

B. Equipment Room Ventilation:

1. A thermostat shall start exhaust fan and open respective motorized damper whenever the room temperature exceeds 85 degrees. When the temperature is reduced to 80 degrees the fan will stop and the damper will close.
2. The BMS shall monitor the damper positions and fan status.
3. The BMS shall alarm on fan failure or incorrect damper position.

C. Apparatus bay exhaust fans:

1. The Apparatus bay exhaust fans shall be manually started and stopped by the BMS via a local switch located in the house watch station.
2. Upon manually starting the fans, the BMS shall open the exhaust damper and intake FSD. Once proven open, the fan shall start.
3. Upon Manually stopping the fans, the reverse sequence shall occur.
4. The BMS shall monitor the damper positions and fan status.
5. The BMS shall alarm on fan failure or incorrect damper position.

3.13. NEIDERMAN EXHAUST SYSTEM

A. Install all controls and interlocks as provided under Section 236450.

- B. The auto-disconnect exhaust system shall be a 24-volt electromagnetic release type that captures 100% of the exhaust emissions directly from the tail pipe and discharges those emissions to a specific location by means of an exhaust fan. Upon emergency dispatch of the vehicle, the exhaust fan shall automatically start prior to the engine being energized. The exhaust fan shall remain in the "on" position for as long as any engine is running. Upon vehicle exit, the hose assembly remains connected to the tail pipe and automatically disconnects at a specified distance outside the door by de-energizing the electromagnet. The nozzle and hose assembly shall smoothly separate from the vehicle and safely retract to the stored position ready to connect to the vehicle upon reentry. Upon disconnection, the hose assembly shall not be permitted to swing wide or touch the

floor, possibly endangering personnel or apparatus. The hose shall remain at the door, ready for reconnection. Once the apparatus has left the building, the fan will automatically shut down after a preset time interval.

- C. Upon return, the fan is automatically activated prior to vehicle entry and the nozzle is connected to the tail pipe in a standing position. Bending over to connect the exhaust system and expose the operator to harmful exhaust fumes is not permitted. No positive locking device or moving parts shall be permitted to be connected to the tail pipe. After the vehicle has been turned off, the fan can continue to operate for a preset time interval, normally two minutes.
- D. The BMS shall monitor fan status and shall alarm the front end BMS on fan failure.

3.14. CABINET AND UNIT HEATERS

- A. For hot water systems, provide single-temperature room thermostat to cycle fan motor to maintain constant space temperature.
- B. Provide strap-on aquastat on unit return piping to de-energize fan motor when fluid temperature falls below adjustable setting of aquastat.
- C. For electric systems, provide a room thermostat to cycle fan motor and electric element to maintain constant space temperature. Provide integral residual heat sensor to continue fan operation unit element temperature falls below preset point.

3.15. COMPUTER ROOM UNITS

- A. Install all controls provided with computer room units and respective air cooled condensing unit.
- B. Provide interlock wiring between computer room unit and condensing unit.
- C. Room thermostat shall start fan and cycle unit compressors to maintain space temperature setpoint.
- D. The computer room temperature shall be monitored by the BMS. If the temperature increase above the alarm set point, an alarm shall be annunciated at the BMS.

3.16. SPLIT AIR CONDITIONING UNIT

- A. Install all controls provided with air handling unit and air cooled condensing unit.
- B. Provide interlock wiring between air handling unit and air cooled condensing unit.
- C. Room thermostat shall start fan and cycle unit compressors to maintain space temperature setpoint.
- D. The computer room temperature shall be monitored by the BMS. If the temperature increase above the alarm set point, an alarm shall be annunciated at the BMS.

3.17. GEOTHERMAL PLANT

- A. Pumps
 - 1. The pumps shall be enabled and run by the BMS whenever the VRF system calls for water.
 - 2. A differential pressure sensor installed across the geothermal supply and return lines will be used by the BMS to control the lead pump speed to maintain a Differential Pressure

setpoint. When the lead pump is operating at a speed greater than 90%, the lag GP pump will be enabled. The BMS will synchronize the two pumps and reset their speeds to a lower speed as needed to maintain system differential pressure. If the pumps drop to within 5% of minimum speed, the BMS will disable the lag pump and continue to maintain pressure using only the lead pump.

3. Equipment rotation methods will be adjustable from the BMS. Rotation can be set manually by the operator, based on equipment runtime, or weekly rotation. With runtime rotations, the equipment with the least number of run hours will be established as the lead unit to be called. The remaining assets will be set in numerical order from the lead unit. With weekly rotations, the BMS will rotate equipment in numerical order once a week (Monday at 4 pm). Under manual rotation, the operator will be able to set the rotation order from the BMS. If any unit is not available due to failure, the BMS will remove the unit from rotation and call the next available unit in order of rotation. If the called unit becomes unavailable and another unit is available and not called, BMS will switch the equipment by shutting off the unavailable unit and calling the available one. If the called unit becomes unavailable and no other equipment is available and is not already being called, the BMS will continue to call for the unavailable unit to run.
4. If the pump is running at its minimum speed, the differential pressure bypass control valve will modulate to bypass supply water to the return as system pressure builds up due to hot water control valves closing.
- B. The lead pump VFD shall modulate the pump speed to maintain the differential set point temperature between the supply and return in the Primary loop. As the differential decreases below the set point, the VFD shall slow the pump speed down. On an increase in differential temperature, the lead pump VFD shall increase pump speed. On a continued increase in temperature, the stand by pump VFD shall start and shall increase pump speed to maintain differential temperature. Differential temperature set point shall be set at 10F for cooling and 6F for heating.
- C. On a drop in space temperature, the reverse sequence shall occur.
- D. Pumps shall be enabled whenever the condensing unit calls for water and its associated solenoid valve has opened. the pump minimum speed shall be set by the differential pressure sensor to maintain minimum flow through the units. Any increase in speed above minimum shall be based on temperature.

3.18. COLD CONDENSATE PUMPS

- A. Install all controls supplied with hot and cold condensate pumps.
- B. Condensate pumps shall automatically shut down the associated unit on sense of high limit.
- C. All Pans under AC units shall be provided with a leak alarm that shall sound an alarm and shut down the associated unit.

3.19. CARBON MONOXIDE AND METHANE MONITOR.

- A. Provide a carbon monoxide and methane monitoring and alarm system within the boiler and residential domestic hot water room. Provide a MSA (Material Safety Company) 9010/9020 controller with Altima X Series sensors or approved equal; one for carbon monoxide and one for methane. The carbon monoxide sensor shall be mounted 4 feet AFF and the methane sensor shall be mounted near the ceiling.

- B. Upon activation gas alarm station controls shall enact an orderly shutdown of all boilers/domestic hot water heaters and annunciate an alarm.
- C. Upon activation of alarm, the BMS shall also alarm.

3.20. VARIABLE REFRIGERANT FLOW SYSTEM (VRF)

- A. Install all controls provided under Section 236450 and provide interlock wiring between fan coil units, branch controllers, and condensing units. The BMS shall monitor the VRF system through a Factory provided BACnet card. The BMS shall be able to Pull data and control fan speed, mode of operation and set point temperature through the BMS. System operation shall be via the unit manufacturer's controls.
- B. Units shall be automatically started and stopped via remote mounted programmable thermostats. Thermostat shall automatically index unit to "heat", "cool" or "dehumidification" based on desired setpoints. Units that are not capable of being locked out via a password programming shall be provided with a locking cover to prevent tampering.
- C. Indexed to "heat", supply fan shall start and thermostat shall stage compressor and reversing valve to maintain setpoint temperature.
- D. Indexed to "cool", thermostat shall stage compressor and reversing valve to maintain setpoint. Supply fan shall run a lower speed on the first stage of cooling. On the need for higher cooling performance the system will activate the second stage of cooling and automatically switch the fan to the higher fan speed setting.
- E. Indexed to "dehumidification", thermostat shall cycle reversing valve and compressor on the first stage of cooling. Fan shall run at low speed.
- F. Supply fan ECM motors shall provide soft starting, maintain constant CFM over its static operating range (adjustable) and provide airflow adjustment on its control board.
- G. A leak detector in the auxiliary drain pan of the unit shall shut down the unit in the event of water detection. The shutdown of one unit shall not shut down the entire system.
- H. On a call for heating or cooling, the lead unit geothermal water isolation valve shall open and the geothermal pump shall start. On an increase in load, the secondary unit isolation valve shall open.
- I. Water-cooled system, a relay shall enable start-up of A/C system. A flow switch shall prevent unit operation without proper flow. A water regulating valve shall be provide to automatically control condenser water flow based on unit head pressure.

3.21. DHW System

- A. Install all controls and interlocks.
- B. The BMS shall monitor and log:
 - 1) The solar HW pumps status and KW/KWH usage.
 - 2) The supply and return water temperature of the solar system.
 - 3) The DHW tank temperature and the building supply water temperature.
 - 4) The gas furnace usage
 - 5) The PV system incoming (PV array to the charge controller) and outgoing KW and KWH usage.

3.22. ELECTRICAL Metering

- A. The BMS shall meter (monitor and log) the building KW and KWH. Coordinate meter location and requirements with electrical subcontractor.

3.23. GAS Metering

- A. The BMS shall meter (monitor and log) the building gas consumption. Coordinate metering location and requirements with the plumbing subcontractor.

END OF SECTION

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SECTION 23 0994 - SPARK DETECTION SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements
- D. The spark detection system shall be a micro-processor based system designed to detect a spark before it reaches other downstream processes or filtration equipment, thus eliminating the potential for fires and explosions.
- E. System must be Factory Mutual Approved, and approval report number must be listed.

PART 2.00 - PRODUCTS

2.01 CONTROL CABINET

- A. Control cabinet shall be fully microprocessor based with an event recorder capable of memory of at least 2,500 events. This memory shall be a circular memory so as to feed out the old and input the new when the memory is full. Control Console shall be equipped with RS-485 Serial Port for interface to a remote printer or computer. Two zone horns shall be factory provided for audible indication of alarm.
- B. Control cabinet shall have a user-friendly operating menu with critical operation parameters password protected for security.
- C. The control cabinet shall receive the alarm signal from the spark sensor from the local alarm and immediately activate the relay contacts. An LCD readout shall be provided to indicate the affected zone, date of the alarm, time of the alarm, the number of sparks, and whether the threshold setting of number of sparks has been exceeded. A visual light for alarm and audible zone alarm shall be annunciated.
- D. The control cabinet shall be programmed to be capable of activating two separate dry relay contacts; i.e., from a first spark alarm or when exceeding a pre-set threshold due to a pre-set number of sparks in a preset time frame. The spark threshold shall be adjustable to the customer's requirements.
- E. The control cabinet shall have a NEMA 12 rating, non-ventilated and microprocessor based with solid-state circuitry. Terminal connections should have easy access, and all components should be plug-in type. The internal components should be easily removable and replaceable if maintenance is required.
- F. The control cabinet shall provide powered terminals for two external horn and light device, summation alarm and trouble dry contacts, trouble contacts for system disabled and alarm contacts. A separate 120V AC power circuit shall be provided for the horns.

- G. The control cabinet shall be either wall mounted or free standing, and require 120 volt AC power supply with all working voltage, internal and external, to be 15/24 volt DC and a wire requirement of no more than three (3) wires for the sensors. No AC voltage is to be run next to sensor or valve wiring or within the conduit.
- H. Testing of each sensor shall be automatic at four (4) hour intervals. In addition, the system shall have the capability of manual testing of the sensors. System integrity shall be monitored at all times by the control console components and shall produce an alarm in case of any system troubles.
- I. The control panel shall be capable of monitoring two (2) zones. The control panel shall be Grecon CC5002 or approved equal.

PART 3.00 - EXECUTION

3.01 SPARK SENSORS

- A. The standard spark sensors are to be located in ducts susceptible to sparks. Sensor shall be an infrared type sensor responsive to radiation in the 800 to 1,100 nanometer range with a mean temperature of 600 °C (1,112 °F) and operate in an air stream temperature not to exceed 158 °F.
- B. Sensor shall be infrared type of the highest sensitivity electronic photo diode type to detect the tiniest of sparks.
- C. Sensors shall be electronically stable with the longest possible time exposure of the spark signal to the photo diode, providing confirmation of signal. Shielded cable shall not be a requirement.
- D. Spark detection sensors, etc., must not be responsive to VHF and UHF radio frequencies or other electrical interferences.
- E. Sensors must have the ability to detect individual sparks in an air stream up to 10,000 FPM.
- F. No more than two (2) sensors shall be required in ducts up to 79" (2,000 mm) in diameter.
- G. Spark sensors shall be mounted on a duct with a stainless steel adapter for pipes 9" diameter or larger and a mounting band for pipes 8" diameter or smaller. The adapter shall be installed from the outside duct with the use of a special tool kit to be supplied with the sensors and will mount in such a manner as to prevent build-up of materials on the lens cover.

END OF SECTION

SECTION 23 1000 - FUEL GAS SYSTEM

PART 1.00 -GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to provide a piped Fuel Gas System as shown on the drawings and as specified herein.
 - 1. Gas service.
 - 2. Piping and valves.
 - 3. Installation of gas meters, regulators, risers, mains and branches.
 - 4. Gas booster and all control / interlock wiring including wiring to equipment and pressure switches.
 - 5. Connection to domestic hot water heater.
 - 6. Valved outlets for future connections.
 - 7. Piping to within 5'-0" of boilers and other HVAC equipment.
 - 8. Gas regulators & vent piping.
 - 9. Connection to kitchen equipment.

1.03 RELATED WORK

- A. Common Work Results for Plumbing - Section 22 0511
- B. Plumbing Tests -Section 22 0513
- C. Plumbing Equipment and Accessories - Section 22 3000
- D. Motors and Motor Controllers _ Section 22 0514

1.04 QUALITY ASSURANCE

- A. A.N.S.I. -American National Standards
- B. F.S. -Federal Specifications
- C. N.F.P.A. -National Fire Protection Association
- D. A.G.A. -American Gas Association
- E. C.G.A. -Compressed Gas Association
- F. U.L. -Underwriters Laboratory
- G. N.Y.C.M.E.A. -New York City Materials Equipment Acceptance

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Gas Meters.
 - 2. Gas Boosters.
 - 3. Piping valves, fittings, strainers, supports, sleeves, anchors and guides.
 - 4. Controls.
 - 5. Regulators.
 - 6. Pressure and Flow Control Modules ("PFCM").

PART 2.00 - PRODUCTS

2.01 BASE BID MANUFACTURERS

- A. Gas Booster Pump System:
 - 1. Eclipse
 - 2. Spencer
 - 3. Nash
- B. Electrically Operated Valves
 - 1. Asco
 - 2. De Zuric
 - 3. Keystone

2.02 GAS PIPE AND FITTINGS

- A. Exterior/Underground:
 - 1. Gas piping shall meet the local Gas Company guidelines or shall be as follows:
 - a. Black steel, extra heavy Schedule 80 with maker's name rolled in the metal conforming to ASTM standard sizes and weights. Pipe three inches in diameter and larger shall be seamless. All pipes shall meet latest ASTM A53-47, A120-47, A135-46, and A139-46.
 - b. All joints in underground piping shall be welded by an AWS certified welder. Dresser type connections in exposed locations are permitted at drip pots and valve.
 - 1. Steel piping less than 4 inch shall be butt welded conforming to ANSI B16.9.
 - 2. Pipe 4 inches in size and larger shall be lap-welded.
 - c. Piping shall be coated with Hill-Hubbell Spec. BAX-1 pipe covering or approved equal.
 - d. Welding fittings shall be of the same material and schedule as the pipe to which they are welded. Steel welding: Standard weight seamless steel, ANSI B-16.9 and ASTM A-234. Buried fittings, tees, or elbows shall be coated similar to pipe.
- B. Inside:
 - 1. Piping shall be Schedule 40 steel pipe with fittings as follows:
 - a. 3" and smaller: Threaded malleable iron. Malleable iron: Threaded and banded, standard weight except as noted, ANSI B-16.3.
 - b. 4" and larger: Steel welding. Steel welding: Standard weight seamless steel, ANSI B-16.9 and ASTM A-234.

2.03 GAS VALVES

- A. Exterior/Underground:

1. Exterior gas valves shall meet local Gas Company requirements or shall be similar to Style 90 "Dresser" and iron body lubricated plug type:
 - a. Walworth No. 2907 modified, 50 psi WOG, with galvanized steel extension pipe and cast iron flush box with lock, marked "Gas".
 - B. Inside:
 1. Low pressure natural gas valves shall be AGA standard gas cocks.
 - a. Up to 1" size tee head: Walworth No. 594. Up to 2" size square head, Walworth No. 590.
 - b. 2 1/2" and over, flanged, iron body lubricated plug type 175 psi WOG Walworth No. 1796.
 2. Provide operating wrenches with each valve.
- 2.04 MASTER GAS CONTROL STATION
- A. ASCO, catalog No. 216B89 consists of key operated, normally open switch and a normally closed pushbutton mounted in a stainless steel face plate for flush installation. "Gas Valve Control" is inscribed on the face plate, and the switches are labeled "open" over the key switch and "shut" over the pushbutton. Provide relay panel #108D10C.
 - B. Enclosure: NEMA 1, 16 gauge flush type cabinet with a 3/4" conduit knockout on each side. Two Phillip head screws hold the door closed to prevent accidental or mischievous opening of the cabinet. Cover to be "break-glass" type and shall be mounted in corridor.
- 2.05 GAS BOOSTER SYSTEM
- A. Provide factory-built and factory-tested packaged gas booster systems as indicated, of sizes, configuration, and capacities as scheduled, and as specified herein.
 - B. General
 1. Complete U.L. listed gas booster system capable of delivering a volume of natural gas while elevating gas pressure to a level required to adequately operate the gas fired equipment. The system shall contain all the required devices in order to provide a completely automatic operating system in full accordance with the requirements of the Utility Company.
 2. The system shall include but not be limited to: appropriately sized gas booster pumps, check valves, gas pressure switches, heat exchanger, lubricated plug valves, flexible pipe couplings, gas pressure gauges, PFCM, control and indicating devices, and field support as specified hereafter.
 3. The entire gas booster system shall be furnished by a single source vender who shall be responsible for all aspects of design, coordination and operation of all components of the system.
 4. This contractor shall be responsible for all the interlock wiring of gas-fired equipment to the gas booster, if such interlocking is required. This contractor shall be responsible for all wiring associated with interlocking the low pressure cutoff switch (located by the gas meter at the point of entry as required by the Utility Company) to the gas booster.
 - C. Hermetically Sealed Centrifugal Gas Booster Pump
 1. U. L. listed and of the hermetically sealed type. The design of the booster shall enclose the direct coupled motor and fan in an air tight steel housing without the requirement of external shaft seals. The fan shall be manufactured of spark resistant aluminum and shall be accessed through a fully gasketed cover plate assembly.
 - a. For ease of installation the booster design shall provide four (4) different mounting configurations. These configuration options shall allow booster outlet to be positioned in such a way as to facilitate piping connections and eliminate excessive piping pressure loss.
 - b. The booster shall include a class 1, Group D, explosion proof motor.
 - c. A factory mounted, U. L. listed junction box with sealing unilet shall be provided in order to make all necessary wiring connections.
 - D. Check Valves
 1. Horizontally mounted F. M. approved disk type check valve shall be installed on the inlet to the gas booster. Check valves shall be constructed of heavy duty cast iron with a removable top for

ease of inspection and maintenance and shall have all 316 stainless steel trim with soft seats. Check valves shall be designed to withstand a back pressure differential of a minimum of 10 PSIG across the seat and shall be similar to Eclipse Series 1000.

E. Recirculation Loop and Heat Exchanger

1. A cooling recirculation loop shall be provided which shall be used to provide adequate gas flow in order to cool the gas booster motor during low flow conditions. As an integral part of the recirculation loop an air to air heat exchanger shall be installed in the loop piping. The heat exchanger shall be of the single pass modular type and shall be constructed of corrosion resistant aluminum.
2. The heat exchanger shall have a self contained, temperature controlled fan and motor assembly which shall be controlled by the gas booster control system. The heat exchanger fan shall be operated when the temperature of the booster discharge is above setpoint.
3. In the discharge of the heat exchanger the contractor shall install an additional disk type check valve sized in accordance with gas booster manufacturer's recommendations. Check valve shall be similar in design to that previously specified.

F. Gas Booster Control System

1. A completely factory built gas booster control system shall provide safe, proper automatic operation of the gas booster pump.
2. The control system shall be furnished by a single source vendor who shall be responsible for all aspects of design, coordination and operation of all components of the entire gas booster system. The control system shall be a standard cataloged item which has been particularly designed for this application and shall have had field usage for at least three (3) years. Non standard controllers or controls not furnished by the booster vendor will not be acceptable.
3. Control system shall include as a minimum the following:
 - a. PFCM device
 - b. Nema 7 wall mounted enclosure
 - c. Fusible disconnect switch with external handle
 - d. Nema rated magnetic motor starter with overload protection for booster
 - e. Motor contactor for heat exchanger (when required)
 - f. Indicating lights for: Power on, Booster on, Low Gas Pressure and Heat exchanger on (when required)
 - g. Digital temperature controller with remote sensor for heat exchanger (when required)
 - h. Booster on/off switch
 - i. 4" alarm bell with silencing switch: to ring on low gas pressure
 - j. Low gas pressure switch – to be located at gas point of entry
 - k. Start circuit interlocks with all gas-fired equipment
 - l. Engraved nameplates for all components
 - m. Numbered terminal strips for field connection
 - n. Booster control system shall be equivalent to Eclipse Series HBP
2. Wired to the gas booster control system shall be a U.L. and F. M. listed low gas pressure switch which shall be set to open when inlet gas booster pressure falls to 3" W. C. Gas pressure switch shall be located downstream of booster in gas meter room as required by the Utility Company and Code.
 - a. When the switch opens it shall de-energize the booster motor control circuit disabling the booster. The switch shall also indicate a low gas pressure alarm on the front of the gas booster control panel.
 - b. The low gas pressure switch shall be explosion proof, manual reset type and shall have an adjustment range of 1" to 30" W.C. The switch shall be constructed in such a way as to allow for adjustment of the control setpoint without opening the explosion proof housing. Venting of the switch shall not be required. Locate low gas pressure switch by meter as required by the Utility Company.
 - c. The low gas pressure switch shall be similar to Mercoid Model PRE-153.

G. Coordination, Field Service and Quality Assurance

1. In order to provide a properly operating gas booster system the manufacturer shall review all aspects of the installation in advance of gas piping being installed, including gas piping layout shop drawings, boiler gas train pressure requirements, and total load requirements for the proposed project. Upon verification of this information the manufacturer shall furnish a gas booster design data sheet to the COMMISSIONER outlining the parameters for system design including but not limited to:
 - a. No. of appliances, total CFH minimum and maximum.
 - b. Gas booster inlet pressure
 - c. Gas pressure required at boiler train inlet
 - d. Total equivalent length of gas piping including fittings
 - e. Discharge pipe diameter
 - f. Total discharge pipe pressure loss
 - g. Selected gas booster Model NO.
 - h. Booster flow capacity (CFH)
 - i. Booster discharge pressure (W.C.)
 - j. Total discharge pressure (W.C.)
 - k. Booster inlet pipe diameter
 - l. PFCM settings for flow and pressure
 2. The booster manufacturer shall provide all required field service assistance for installation supervision and equipment start up. Upon completion of system start up the booster manufacturer shall furnish a written certification to the City of New York and Con Edison that the gas booster system operate in accordance with design standards.
 3. After successful system start up the gas booster manufacturer shall provide one (1) year field service for all system components.
- H. The gas booster system shall be manufactured by the Eclipse Combustion Co Series HB or approved equal.
1. Vents outlets shall not be located under a window, overhang, projection or any opening leading back into the building.
 2. The size of the vent lines shall be as indicated on the Drawings. If the installation of the vent lines differ from the Drawings, the Contractor shall increase the size of the vents as directed by the Engineer at no additional cost to the City of New York.

PART 3.00 - EXECUTION

3.01 GENERAL

- A. Make the necessary arrangements with the Utility Company to bring service connection to points shown on the drawings, or as required by the Utility Company, and provide the necessary pipe, fittings, valves, service, cocks, governors, etc., to extend these services to the gas system.
- B. This division shall examine the latest Utility Company regulations governing gas service installation and all work must be in strict accordance with such regulations.
- C. Exact locations of gas service at property line shall be secured from the Utility Company by this division and shall be coordinated with electric service location, sewers and water services.
- D. Certain equipments, such as meters, will be furnished by the Utility Company, however, this division shall furnish and install any additional equipment and materials not furnished by the Utility Company, to make this service complete.
- E. If this division is required to extend gas service from the property line into the building, gas service line shall pitch toward the building and be provided with drip leg and plugged outlet, or drip pot, as required.

- F. From the gas cock or valve, continue gas main to the meter which will be furnished by the Utility Company, but which shall be erected as part of the work of this division, on approved supports furnished under this division, as directed by the Utility Company. From the meters, furnish and install gas supply mains with branches and connections to equipment. If the Utility Company does not furnish and install service cock (curb cock), same shall be installed by this division.
- G. Branch piping shall be installed to a point close to each boiler burner, as indicated, and left ready for the connections to the gas burners, which connections will be provided under the Mechanical Division. Branch piping shall be provided with shut-off valve.
- H. All outlets shall be left capped until connected to fixtures and all stoppages shall be removed.
- I. At the time of installation of the meters, this division shall contact the Utility Company for exact meter dimensions.

3.02 PIPING SYSTEM INSTALLATION

- A. General
 - 1. For general piping installation, accessories, sleeves, supports, etc. see requirements of Section 220511 Common Work Results for Plumbing.
 - 2. For general valve installation, accessories, etc. see requirements of Section 220523 General Duty Valves for Plumbing.
- B. Gas Piping:
 - 1. All gas piping and system installation shall conform to NFPA, "National Fuel Gas Code", NFPA Pamphlet No. 54, and "New York City Plumbing Code" Part 1, latest editions.
 - 2. Provide all gas piping to all gas outlets and equipment requiring gas connections. Make all connections to such outlets and equipment and provide a full main size plug cock for each.
 - 3. Piping shall be free of traps with drain pocket consisting of nipple and cap at low points.
 - 4. All gas fittings shall be subject to the approval of the Utility Company and the public authorities having jurisdiction.
 - 5. Do not install gas valves in suspended ceilings.
 - 6. Gas piping shall NOT be installed under floor slabs, inside of building. Piping may only be installed under the slab in vented tunnels, trenches or shafts.
 - 7. All gas piping installed in public corridors leading to an egress shall be encased in construction providing a 2 hour rating.
- C. Union or right and left nipple coupling:
 - 1. Equipment side of individual gas cock.
- D. LP threaded Joints: Special LP gas-resistant pipe dope.
- E. Stop Cocks: Connection to each piece of equipment.
- F. Where gas pipes are exposed to freezing, they shall be insulated under this division.

3.03 GAS PIPING VENTING

- A. Gas service piping and gas meter piping shall have vent and relief piping installed and sized in full accordance with the requirements of the serving utility.
- B. Gas train venting (Boilers and Water Heater):
 - 1. Gas vents from boilers shall not be combined with the water heater gas vents.
 - 2. Gas vents from one boiler shall not be manifolded to gas vents from other boilers.
 - 3. Normally open vent valve must be piped separately and directly to the outside.
 - 4. Vent piping from pilot system (firm gas) and main burner system (interruptible gas) cannot be combined.
 - 5. Gas vents from gas pressure regulator and high and low gas pressure switches can be manifolded.

6. Gas vents shall terminate a minimum of 18" above outside grade and shall be equipped with a utility approved weather proof vent cap. Vents shall terminate at least 2 feet laterally from any building opening, window or door.

3.04 GENERAL REQUIREMENTS FOR ALL FUEL GAS EQUIPMENT

- A. Examination
 1. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance.
 2. Examine roughing-in for ductwork, piping, and electrical connections to verify actual locations before installation.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Installation
 1. Secure all equipment to building structure and install equipment in accordance with approved detail drawings, manufacturer's instructions, and all codes and regulations which apply.
 2. Install all accessories not factory installed.
 3. Install equipment level and plumb unless otherwise noted.
 4. Install equipment with required access and clearances. If there are field condition that prevent providing access and clearances notify the COMMISSIONER. If the equipment is installed before rectifying the access and clearance issues the Contractor shall be require to remove and re-install the unit as required and make any associated changes to the associated ductwork, piping, wiring and controls at no cost to the Owner.
 5. Where required suspend equipment from structure or mount on concrete base or stand with vibration isolators. Vibration isolators are specified under Section "Vibration Isolation and Seismic Restraints."
 6. Install sensors and controls supplied with the equipment.
- C. Connections
 1. Piping installation requirements are specified in other sections.
 2. Drawings indicate general arrangement of piping, fittings, and specialties. Arrange connections as per approved shop drawings.
 3. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
 4. Install piping adjacent to equipment to allow service and maintenance.
 5. Ground equipment.
 6. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
- D. Field Quality Control
 1. Testing: Perform the following field quality-control testing and report results in writing:
 - a. After electrical circuitry has been energized, start units to confirm proper motor.
 - b. Test and adjust controls and safeties
 2. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- E. Cleaning
 1. After installing units, inspect equipment for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
 2. After installing equipment, clean internally according to manufacturer's written instructions.
 3. Install new filters in equipment within two weeks after start up.
 4. Basket strainers shall be initially cleaned two week after start-up with a second cleaning two weeks after that.
- F. Start Up
 1. Verify that equipment is installed and connected according to approved shop drawings and contract drawing.

2. Adjust flows and controls.
 3. Test and adjust controls and safeties. replace damaged and malfunctioning controls and equipment.
- G. Factory Start Up Service
1. Engage a factory-authorized service representative to perform startup service for the following equipment or as specified under Commissioning:
 - a. Gas Booster Pump systems
 2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
 3. Complete installation and startup checks according to manufacturer's written instructions.
 4. Prepare a written startup report that records results of tests and inspections.
- H. Demonstration and Training
1. Engage a factory-authorized service representative to demonstrate the equipment's operation and to train Owner's maintenance personnel to adjust, operate, and maintain units as specified under Commissioning.

END OF SECTION

SECTION 23 2113 - PIPING AND ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements
- D. Piping, fittings, valves and accessories shall be suitable for the pressure and temperature of service.
- E. The shall be responsible for establishing grades and elevations, and checking of all interferences, and shall verify size and locations of all piping in the field prior to the start of installation of equipment and piping. Certain items such as rises and drop in piping, piping offsets, valves, access doors, fittings, sleeves, drain valves, traps, air vents, are indicated on the contract drawings for clarity for a specific location requirement and shall not be interpreted as the extent of the requirement for these items. The shall, at his expense, perform all minor rerouting of piping around obstructions from new or existing construction whether or not such conditions are indicated on the plans. Minor rerouting of piping is defined as any rerouting which requires less than 10 linear feet of additional piping (measured along the centerline) over and above that shown on the drawings with piping of a size equal to that shown in the original routing. Whenever an obstruction requires more than a minor rerouting as defined above, the shall report the condition to the COMMISSIONER prior to the start of pipework on the affected system. The shall be responsible for neglect of checking all elevations, clearances, dimensions and locations of piping systems to prior to the start of work on same.
- F. All piping shall be installed above hung ceiling unless otherwise noted. shall coordinate with Architectural drawings for all ceiling elevations.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and service necessary to complete the Pipe and Pipe Fitting Materials, Hangers and Supports as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Hot Water
 - 2. GeoThermal
 - 3. Refrigerant

1.03 RELATED WORK

- A. Insulation.

- B. HVAC Equipment.
- C. Automatic temperature controls.

1.04 QUALITY ASSURANCE

- A. ANSI, ASTM, ASME, AWS.
- B. Comply with requirements of all governing authorities having jurisdiction.
- C. No welder shall be employed who has not been fully qualified and certified by an approved, nationally certified, welding bureau or similar recognized testing agency.
- D. The competent and experienced welders who have qualified shall be retained at the job at all times when welding is done. Each welder shall be in possession of a stamp to identify work performed by him.
- E. Welding material and labor shall be in accordance with the welding procedures of ANSI piping codes. Mark of welder shall be stamped on each welded joint of pipe.

1.05 SUBMITTALS

- A. Shop drawings indicating pipe layout (3/8" scale), sizes, types of materials, details, attachment and installation. Coordinate the work with other trades doing sheet metal work, electrical work and general construction .
- B. Product Data: Manufacturers' printed data, catalog cuts, recommended connections and installation methods. Submit for valves, fittings, strainers, supports, sleeves, anchors and guides.
- C. Samples, when requested.
- D. Manufacturer's test data.
- E. Reports of pipe field hydrostatic test.

1.06 DELIVERY, STORAGE & HANDLING

- A. Deliver materials properly identified as to type, size, manufacturer's name, specification code, etc., and undamaged.
- B. Do not store exposed to weather; cover with suitable type material to protect from damage.
- C. Properly protect all piping so as to prevent damage to the pipe or the introduction of foreign material into the pipe. For the purpose of protecting piping from pre-installation contamination, all piping shall be shipped to the jobsite with suitable caps, sheet metal covers or plugs. Pipe caps, etc. shall not be removed until just before installation.
- D. Cap or plug all openings in pipe and pipe fittings during installation.
- E. During loading, transporting and unloading, use care to prevent injury to pipes and pipe fittings. Do not drop pipe or fittings. Examine all pipe and fittings before laying. Do not install any piece that is found to be defective.
- F. Store and protect all materials from injury prior to installation. Do not store any materials directly on the ground or floor. Keep materials as clean and dry as possible and free from damage or deteriorating elements.

- G. Remove and replace with sound pipe any defective pipe and pipe fittings discovered after installation without additional expense to the City of New York.

PART 2 PRODUCTS

2.01 MATERIALS FOR PIPE

- A. Pipe for the various services shall be as follows:

Service	Size	Material	Type	Weight	Standard
Condensate from Cooling Coils		Plastic	PVC	Schedule 40	ASTM D1785
Hot Water:					
-Runouts to Terminal Units	3/4"	Copper	Soft	Type L	ASTM B-88
-Mains, Risers, Branches, etc.	2" & below	Copper	Hard	Type L	ASTM B-88
	Up to 10"	Steel	Black	Schedule 40	ASTM A53A, S, EWR
Gas	All	Steel	Black	Schedule 40	ASTM A53A, S, EWR
Geothermal Water (Indoor):	6" & below	Copper	Hard	Type L	ASTM B-88
Geothermal Water (outdoors):	1 1/2" & below	HDPE			

Service	Size	Material	Type	Weight	Standard
Refrigerant	All	Copper	Hard	Type ACR refrigerant	ASTM B-280
Refrigerant for VRF Systems	All	Copper	Soft O60 Temper	Type ACR refrigerant	ASTM B-280
Refrigerant Containment Conduit	All	Copper	Hard	Type L	ASTM B-88
		-OR- Steel	Black	Schedule 10	ASTM A53A, S, ERW
Compressed Air	All	Copper	Hard	Type K	ASTM B-88
Automatic Air Vents	All	Copper	Soft	Type L	ASTM B-88
Chemical Feed	1 1/2" & below	Plastic	Polypropylene	Schedule 80	
Cold Water	All	Copper	Hard	Type L	ASTM B-88

- B. All steel pipe shall be new, Grade A, unless noted above and free from rust or scale.
- C. All refrigerant pipe shall be shipped to site capped and filled with nitrogen.
- D. Reinforce piping at all anchor points.

2.02 MATERIALS FOR PIPING FITTINGS

- A. Valves, strainers, gauges, air vents, specialties, and other piping accessories shall be rated for the system pressures as indicated below. Fittings for various services shall be as follows:

Service	Size	Material	Type	Weight	Standard
Condensate from Cooling Coils	All	Wrought Copper	Solder	Standard	ANSI B16.24
	All	Plastic	PVC	Standard	ASTM D2665

Service	Size	Material	Type	Weight	Standard
Hot Water	2" & below	Cast Iron	Screwed	125 psig	ANSI B16.4
		-OR-			
	2 1/2" & above	Wrought Copper	Solder	Standard	ANSI B16.22
		Steel	Welding	Standard	ASTM A234
Emergency Generator Exhaust	All	Steel	Welding	Standard	ASTM A234
Gas	All	Malleable Iron	Screwed	300 psig	ANSI B16.3
Fuel Oil	All	Steel	Welding	300 psig	ASTM A234
ADD FOLLOWING WHEN SYSTEM USED FOR PIPING OUTSIDE OF MER For piping extending from tank room to emergency generator room	All	See Spec Section—Flexible Double Wall Piping Systems	See Spec Section—Flexible Double Wall Piping Systems	See Spec Section—Flexible Double Wall Piping Systems	See Spec Section—Flexible Double Wall Piping Systems
GeoThermal Water	4" & below	Wrought Copper	Brazed	Standard	ANSI 16.22
	6"	Cast Bronze	Brazed	Standard	ANSI 16.22
	8" & above	Steel	Welding	Standard	ASTM A234

Service	Size	Material	Type	Weight	Standard
Refrigerant	All	Wrought Copper	Brazed	Standard	ANSI B16.22
Refrigerant Containment Conduit	All	Wrought Copper	Solder	Standard	ANSI B16.22
		-OR- Cast Iron	Screwed	125 psig	ANSI B16.4
Compressed Air	All	Wrought Copper	Solder	Standard	ANSI B16.22
Automatic Air Vents	All	Wrought Copper	Solder	Standard	ANSI B16.22
		-OR- Bronze	Compression	Standard	ASTM A40-2
Chemical Feed	2" & below	Stainless Steel	Screwed	300 psig	
	2 1/2" & above	Stainless Steel	TIG Welding	Schedule 80	
Cold Water	All	Wrought Copper	Solder	Standard	ANSI B16.22

- B. Weights of fittings shall be as specified above.
- C. All screwed couplings and shoulder nipples not exceeding 5" in length shall be of the same material as the pipe but of dimensions conforming to Schedule 80.
- D. All fittings used at expansion loops or bends shall be of 250 lb. WSP Class.
- E. Cast iron and malleable iron fittings shall be of Crane, Walworth or approved equal.

- F. Welding fittings shall be of the same material and schedule as the pipe to which they are welded. Welding elbows shall be long radius pattern unless clearance conditions necessitate the use of standard radius pattern. Welded tees shall be used where difference between main and branch are two (2) standard pipe sizes or less. Branch connections shall be reinforced with Weldolets by Bonney Forge and Tool Works or welding saddles by Tube-Turn, Walworth or approved equal. Welding fittings shall be Tube-Turn, Walworth or approved equal.
- G. Unions 2" and smaller shall be screwed unless otherwise noted. Unions 2 1/2" and larger shall be flanged. Screwed unions on wrought iron and steel pipe, unless otherwise specified, shall be of malleable iron with bronze ground seats suitable for 300 lbs. WSP. Screwed unions on brass pipe shall be brass, ground joint suitable for 300 lbs. WSP. Flanged unions shall be malleable iron, gasket type suitable for 150 lbs. WSP. Unions shall be as manufactured by Crane, Walworth or approved equal.
- H. Flanges shall be of the same weight as the fittings and valves in each service category. Welding neck flanges shall be used with flanged equipment, etc., on welded lines. All flanges shall be drilled in conformance with ANSI B16.5, 125 lb. or 300 lb. standard steel. Welding flanges shall be of steel. Laps shall be machined on front, back and edge and loose flanges have face and bore machined. Screwed flanges shall face perpendicular to adjoining pipe.
- I. Flange joints shall be faced true, packed and made up perfectly square and tight. Each flange joint shall be provided with best grade steel bolts with square forged heads and with cold-pressed semi-finished hexagon nuts. Bolts and nuts shall be dripped in a mixture of graphite and oil, just before installation. All threads shall be U.S. Standard. Gaskets shall be one-piece ring type 1/16" thick full face, suitable for temperature, pressure and service of systems.
- J. Solder for solder-type fittings shall be of 95% tin and 5% antimony.
- K. Brazing material for refrigerant piping shall be 15% silver, 5% phosphorous, 8% copper, brazing filler as manufactured by J.W. Harris, Mueller Industries, Nibco Inc., or approved equal.
- L. Dielectric Fitting: Dissimilar connections shall be made with an insulating dielectric material such as Teflon or neoprene (i.e., between copper and black steel pipe).

2.03 PIPE SUPPORTS, HANGERS AND INSERTS

- A. Products of B-Line Systems, Fee and Mason Mfg. Co., Grinnell Co., Inc. or Grable Mfg. Co. will be acceptable in place of particular manufacturer's catalog figure number specified herein. Submit shop drawings, bulletins, catalog figure numbers, or samples as may be requested, of supports, hangers, inserts, toggle bolts, proposed to be used for various conditions; obtain approval before installing same.
- B. Provide one of the following types of hanger for overhead support of horizontal piping:
 - 1. For copper tubing where hangers are in direct contact with tubing, use clevis type steel hanger, copper plated, Fee and Mason Fig. 364, with supporting rod to suit.
 - 2. For all piping 6" and smaller, use clevis type hangers, Fee and Mason Fig. 239.
 - 3. Provide supporting rods for hangers of diameter and of lengths as required, with double locknuts for each.
- C. Where hanger rods leave unsightly holes in ceilings in finished areas, provide steel ceiling plates, Fee and Mason Fig. 279 or cast iron ceiling plates with set screw, Fig. 290.
- D. Provide one of the following to support horizontal piping from wall:

1. Where no provision for expansion and contraction is required and pipe can be located close to wall, use steel J-hook, suitable for pipe sizes up to 3", Fee and Mason Fig. 146.
 2. For hanger suspension, 750 lb. maximum loading, use light welded steel bracket with hole for one rod up to 3/4" diameter, Fee and Mason Fig. 153. For additional rod suspension, use with this bracket steel clip Fig. 153C for pipe sizes up to 3".
- E. Vertical piping supports for copper tubing where hangers are in direct contact with tubing, use copper tubing riser clamps Fig. 368. For steel or cast iron pipe use steel extension pipe clamps Fee and Mason Fig. 241.
- F. Where beam clamps are required, use malleable iron "C" clamps with case hardened cup pointed set screw and retaining strap, Fee and Mason Fig. 255 or beam clips, Fee and Mason Fig. 254 or Fig. 388 as required or directed.
- G. Concrete inserts shall be approved for local use and shall be black malleable iron universal type, for threaded connections with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms, Fee and Mason Fig. 2570.
- H. Where piping is to be supported from Terra-Cotta tile construction, provide toggle bolts as manufactured by Rawl, Hilti, or approved equal.
- I. All insulated pipe shall be protected at supports by pipe saddles. Pipe saddles for use on hangers shall be Insul-Shield pipe saddles as manufactured by Insul-Coastic Corp. or approved equal.
- J. Steel anchors of an approved design shall be provided where indicated or required for proper control of stress in piping due to expansion. Anchors shall be made of structural materials of heavy cross section and securely fastened to building construction. Submit detail drawings for approval before installation.
- K. Provide pipe alignment guides where indicated, required or directed, to guide the expanding pipe to move freely from anchor points in expansion joints, loops or bends. Construct with angles or channels. Submit detail drawings for approval before installation.

2.04 EXTERIOR WALL/PIPE PENETRATIONS

- A. Underground pipe through wall penetrations shall be sealed with positive hydrostatic seals. The modular mechanical seals shall consist of interlocking rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seals shall be "LINK SEALS" as manufactured by Thunderline Corporation of Wayne, Michigan or an approved equal. Caulking or other type of mastic sealants or lead or oakum joints are not acceptable. The shall determine the required inside diameter of each wall opening or sleeve to fit the pipe LINK SEAL. The LINK SEAL size and model shall be as recommended by the manufacturer's instructions.

2.05 SLEEVES

- A. Make sleeves of galvanized steel pipe when they are located in concrete beams of concrete fireproofing, water proofed floors or where subject to moisture.
- B. In all other locations, sleeves shall be constructed of galvanized sheet steel with lock seam joint of following minimum gauges: 24 gauge for 2" and smaller; 22 gauge for 4" to 6" inclusive; 20 gauge for sizes over 6".
- C. Sleeve flashing shall be 16-ounce soft sheet copper, or a 4-pound lead flashing.

2.06 ESCUTCHEONS

- A. Escutcheons shall be one piece with set screw except where otherwise noted, constructed of the following material.
 - 1. White painted sheet brass or steel for pipes passing through white prefinished ceilings.
 - 2. Cast iron, deep cut type project above finished floor.
 - 3. Heavy, solid pattern steel or cast iron with set screw for all other piping.
- B. Provide escutcheons on all pipes passing through floors, walls, partitions and ceilings where exposed to view in occupied areas. Also provide escutcheons within custom or factory-fabricated cabinet enclosures.

2.07 VALVES - GENERAL

- A. Provide all valves and piping accessories required to complete the installation of all heating, ventilating and air conditioning systems indicated on the drawings and as specified.
- B. Provide valve tags and charts 2" diameter, 18 gauge aluminum or brass, embossed numbers filled in with black paint, fastened by heavy aluminum or brass hooks/chains on all valves and controls (except equipment shutoff valves).
- C. Valve design, material of component parts, workmanship and other features shall be similar to the following Hammond Valve Corporation catalog numbers for various types listed.
- D. Automatic motorized valves for temperature control shall be furnished under Automatic Temperature Control section for installation under this section.

2.08 GATE VALVES

- A. Water service (40°F to 200°F) 2 1/2" and larger flanged iron body, solid wedge, non-rising stem, 125 psi wsp, Fig. IR-1138.
- B. Water service (40°F to 200°F) 2" and smaller soldered, bronze body, inside screw, non-rising stem, 125 psi wsp, Fig. IB-647, or screwed bronze, inside screw, non-rising stem, 125 psi wsp, Fig. IB-645.

2.09 GLOBE VALVES

- A. Water service (40°F to 200°F) 2" or smaller - screwed, bronze, composition disc, union bonnet, 150 psi wsp, Fig. IB-413 or soldered, bronze, union bonnet, renewable Teflon disc, 150 psi wsp, Fig. IB-423.
- B. Water service (40°F to 200°F) 2 1/2" and larger, flanged, iron body, bronze trim, 125 psi wsp Fig. IR-116.

2.10 CHECK VALVES

- A. Water service (40°F to 200°F) 2" and smaller - screwed, bronze 125 psi wsp, Fig. IB-940 or soldered bronze 125 psi wsp Fig. IB-941.
- B. Water service (40°F to 200°F) 2 1/2" and larger - flanged, iron body, bronze trim, 125 wsp, Figure IR-1124.

2.11 LUBRICATED PLUG VALVES

- A. Lubricated plug valves for water service (40°F to 200°F) 2" and smaller - tapered lubricated plug, lever operated, bolter cover, screwed ends, Teflon coated plug, fixed adjustment gland, semi-steel body, suitable for 175 psi service. Rockwell Fig. 142.
- B. Lubricated plug valves for water service (40°F to 200°F) 2 1/2" and larger USAS B16.1, 125 psi cast iron flanged, semi-steel body, tapered Teflon coated lubricated plug, lever operated, fixed adjustment gland, bolted cover, 200 psi wsp, Rockwell Fig. 143. Sizes 3" and larger shall be worm gear operated, Rockwell Fig. 149.
- C. Valves shall be suitable for installation between USAS 125# or 150# weld-neck or slip-on flanges without special preparation.
- D. Lubricated plug valves shall be as manufactured by Rockwell International, FMC Corporation or Walworth.

2.12 BUTTERFLY VALVES

- A. Valves shall be resilient lines with Hi-strength Cast Iron body, bronze alloy disc, 14-4PH Stainless Steel shafts, and with EPDM elastomer seats and seals.
- B. Valves through 8" shall have Infinite Position throttling handles equipped with memory stops. Valves 10" and larger shall have gear operators with adjustable memory stops. All valves shall have extended necks allowing clearance for 2" of insulation over the OD of the flanges.
- C. Valves shall be suitable for installation between USAS 125# or 150# weld-neck or slip-on flanges without special preparation.
- D. Butterfly valves for water service (40°F to 200°F) in lines 2 1/2" and larger shall be Series 1200 as manufactured by Norris, Crane, Center Line or approved equal.

2.13 BALL VALVES

- A. Ball valves for water service (40°F to 200°F) 2" and smaller shall be top entry, screwed or soldered bronze with double Teflon torsion seats; Crane Fig. 702 & 702SW discs.

2.14 COMBINATION CHECK, BALANCING AND SHUT-OFF VALVES (TRIPLE DUTY VALVE)

- A. Provide and install in the pump discharge piping of hydronic (chilled, hot and condenser water) systems, combination silent check, balancing, and shut-off valves.
- B. Valves shall be cast iron construction with chatter resistant stainless steel springs, bronze seats, stems and discs and asbestos-free graphite and Teflon packing.
- C. Valves shall have a calibrated stem indicator, a disc designed for silent operation at low flow rates and shall be designed for repacking while under pressure.
- D. Valves shall be designed for (175 psig) working pressure at 250°F, and shall be individually hydrostatically tested at double the rated working pressure.
- E. Valves shall be manufactured by Bell & Gossett, Armstrong, or approved equal.

2.15 COMBINATION BALANCING/SHUT OFF VALVE AND FLOW MEASURING STATION

- A. Provide, where indicated, calibrated valves for balancing hydronic (chilled, hot and condenser water) systems. Valves shall be Illinois - Series 6000, Bell & Gossett Model "CB" or approved equal combination balancing flow measuring valves. Valves 1/2" through 3" shall be of all bronze construction, complete with nameplate, indicating pointer, meter connections with built-in check valves, internal seals around rotating element. Valves 4" and above shall be cast iron body and bronze disc. Valves shall be rated for 300 psi at 250°F.
- B. Provide differential meter, Illinois Model PG-1 or Bell and Gossett Model RO-2, for measuring pressure drops across units and all necessary conversion charts and tables. When water flow balancing is complete, meter, charts and tables shall be turned over to the City of New York.
- C. For variable flow systems, provide pressure independent combination balancing valve and flow measuring station. Valve shall be provided with removable differential pressure cartridge, built-in P/T ports and external lockable flow adjustment handle. Valves 1/2" through 2" shall be bronze, with NPT female connection. Valves shall be rated for 300 psi at 250°F. Valves shall be Bell & Gossett Circuit Setter ULTRASET Model CS or approved equal.

2.16 STRAINERS FOR STEAM AND WATER SERVICE

- A. Strainers of the "Y" pattern 2" and smaller shall be bronze screwed; 2- 1/2" and larger sizes shall be cast iron flanged. Provide each strainer with blow-off valve and hose bibb. Strainers shall be Type "SB" screwed or type "D", flanged as manufactured by SARCO Co., Mueller or Crane.
- B. Strainers shall have a stainless steel or monel screen with 1/32" perforations and a maximum pressure drop of 1 psi at design flow.

2.17 PRESSURE GAUGE

- A. Provide pressure gauge on supply and return pipe connections to all equipment.
- B. Pressure gauges shall be white faced with black numerals, copper alloy brass bourbon tube, 4 1/2" aluminum case, black finish, stainless steel or monel movement, brass socket and pressure snubber where required.
- C. Connect each gauge through a tee handle cock.
- D. Gauges shall be manufactured by Weiss, Terice, Helicoid or Marshalltown.
- E. Pressure gauges shall have a range at least twice the working pressure but in no case less than 0 to 30 pounds.

2.18 THERMOMETERS

- A. Provide thermometer on supply and return pipe connection to all equipment.
- B. Thermometers shall be of the red reading, industrial, adjustable angle type with 9" cast aluminum case, enamel finish, brass stem and brass union type separable sockets.
- C. Thermometers shall be Vari-Angle as manufactured by Weiss, Terice or Marshalltown.

2.19 AIR VENTS

- A. At all points indicated on the drawings and whenever else required to assure the complete venting of all parts of the system, this shall install automatic, float-operated air vents, Sarco No. 13-W, or approved equal capable of venting all air and at the same time preventing the escape of water. Provide valve on cock before each vent.
- B. Each float-operated vent shall be provided with a suitable vent line carried to the nearest floor drain, slop sink or other approved point of discharge.
- C. Access door shall be provided for installation by General where access to vents is required.

2.20 FLOW SWITCHES

- A. Provide a flow switch in each location shown on the drawings and shall be wired as directed. Flow switches shall be the approved equal of McDonnell & Miller Inc. No. FS4-3.

2.21 FLEXIBLE BRAIDED HOSE

- A. Provided (stainless steel or bronze) braided hose with (flanged, screwed, sweat soldered) ends of the pipe sizes as indicated on the drawings and the length necessary for the installation. The hose shall be rated for the system working pressure with a rated safety factor of FOUR.
- B. Submittals shall include original test data showing force/displacement, fittings, material, live lengths, number of corrugations per foot and safety factor at pressure ratings.
- C. Hoses shall be type BSS or CPSB as manufactured by Mason Industries, Inc.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPING

- A. General:
 - 1. Piping shall be installed in neat and workmanlike manner parallel to walls, column center lines but sloped to drain. Work of each trade shall be fully coordinated to provide the design systems without interference between systems. Piping shall be accurately cut, reamed and threaded with sharp dies. Copper piping work shall be performed in accordance with best practices requiring accurately cut clean joints and soldered in accordance with the recommended practices for the materials and solder employed.
 - a. Piping shall be dripped to drain at a constant slope of 1" in 40 feet. Steam condensate, trap discharge, drip, drain, air, and blowdown piping shall pitch up in direction of flow. All air pockets at top of risers shall be vented, all low points shall be drained to permit full system draindown.
 - 2. Minor piping and electrical facilities associated with instrumentation and control are not shown. Interconnection of sensors, transducers, control devices, instrumentation panels, etc. is the responsibility of the and is included by reference in the plans and specifications. Small piping associated with water cooling, drips, drains, and other minor piping may not be indicated to avoid confusion in the plan presentation but shall be provided as part of the contract work.
 - 3. Piping shall be installed so as not to interfere with plumbing fixtures and electrical lighting outlets which must be accurately centered and located. Special attention shall be given to piping above ceilings, which must be kept a sufficient distance from the lighting outlets to

permit later installation of the lighting fixtures and their reflectors. Consult with other trades for exact locations of their fixtures, piping and equipment.

4. Arrange and install piping as indicated, straight, plumb and as direct as possible, form right angles on parallel lines with building walls. Keep pipe close to walls, partitions and ceilings, offset only where necessary to follow walls, as directed.
5. Locate groups of pipes parallel to each other and space them at a distance to permit access for servicing valves. Risers shall not have couplings in runs from one floor outlet to the next.
6. The installation of copper tubing shall be accomplished in such a way as to not touch or come in contact in any way with ferrous metals. Where copper tubing piping or fittings may come in contact with ferrous metal anchors, supports or construction, an insulating non-conductor spacer, similar to lead, rubber, or an approved equal, shall be installed to assure prevention of electrolysis.

B. Fittings:

1. Pipe bending shall be in accordance with the recommended practices of the Pipe Fabrication Institute. Only material conforming to ASTM A106S and A53A may be bent. Sizes below 2" may be bent if filed; sizes 2" and larger shall have factory-fabricated bends. Minimum radius and tangent lengths for field bent piping are indicated in the following table:

Size	Minimum Radius	Minimum Tangent
1/2"	2 1/2"	1 1/2"
3/4"	3 3/4"	1 3/4"
1"	5"	2"
1 1/4"	6 1/4"	2"
1 1/2"	7 1/2"	2 1/2"
2"	10"	3"

2. Piping size change shall be accomplished by reducing ell, reducing tee. Eccentric reduction shall be applied in all piping requiring continuous drainage such as steam, condensate and blowdown piping. Concentric increasers shall be used where flow is in direction of increased size. Provide eccentric reduction, top flat, at pump suction reductions.
3. All welded piping shall be butt welded at circumferential joints. Flanges shall be weld-neck type or slip-on type flanges. Materials and methods for each type and class of piping are generally specified for particular services in this specification.
4. Companion flanges at equipment or valves shall match flanges construction of equipment or valve. Raised face shall be removed at companion flanges when attached to flanges equipped for flat face construction.
5. Gaskets and bolting for steam systems shall be applied in accordance with the recommendations of the gasket manufacturer and bolting standards of the Code for Pressure Piping (ANSI B31.1.0-1967 par. 108, 135). Strains shall be evenly applied without overstress of bolts.
6. Screw threads (ANSI B31.1.0 par. 135.4) shall be made up with piping compound or other sealing method approved to assure tight joints without overrun of thread into fittings. Compounds shall be approved for service application.
7. Threaded pipe shall be carefully cut, reamed or filed out to size of bore removing all chips, worked into place without springing. Provide Teflon tape on the male thread only. Threaded joints when tight shall not expose more than two full threads.
8. Reduction in horizontal water circulation piping shall be made with eccentric reducers with the straight side at the top and the reduction in horizontal steam and condensate return piping shall be made with eccentric reducers with the straight side at the bottom. Use of bushings shall not be permitted.

9. Copper tubing shall be carefully cut, reamed or filed out to size of bore and worked into place without springing.
10. Dielectric couplings or brass adapters suitable for dielectric service shall be provided at pipe connections between steel or cast iron piping and copper piping.

C. Expansion Requirements:

1. All piping shall be installed throughout the project with due regard for expansion to prevent damage to the building, equipment and piping. Provide anchors, loops or approved type expansion joints where indicated or required for the accurate control of movement.
2. Branch connections to mains for heating risers, and radiation shall be made with minimum of three 90° elbows.
3. Bullhead connections in any piping service are expressly prohibited.
4. Expansion pipe loops shall be supplemented with adequate guides as close to loops as possible to preserve alignment and pitch.
5. Securely support pipe anchors, constructed of steel angles and channels, required to keep pipe movement within area of expansion provision. Submit anchor details for approval before installation.
6. Provide adequate expansion allowance for service temperatures and piping materials.
7. When installing piping with loop or bend expansion, subject piping to cold spring, which will take care of about half of total expansion between hot and cold conditions. Make riser offsets in manner to avoid pocket forming due to expansion. Submit anchor details for approval before installation.

D. Sleeves:

1. Mechanical trades shall set all sleeves for their pipes, and equipment. General shall build sleeves in during construction.

E. Concealed Piping:

1. Where so indicated or specified, piping shall be concealed in building construction. Install such piping in time so as not to cause delay to work of other trades, and allow ample time for tests and approval, do not cover before approval is obtained. Wherever possible, run branches passing through floor into partitions, offset above floor close to equipment and expose only as much as necessary for final connection.
2. Where furred spaces are indicated, keep pipes as close to structural members as possible so as to require minimum furring. In case of furred beams, obtain approval of resulting headroom clearance before installing pipes. This is cautioned to check clearances on General Construction Drawings.

F. Relief Vent Piping:

1. Provide relief vent piping for relief valves, tanks, pressure reducing stations, receivers, chillers, etc., as indicated.
2. Pipe size shall be such that cross sectional area is equal to the sum of the areas of the discharge connections of relief valves.
3. Terminate relief vent piping so as to avoid injury to life or property.

3.02 HYDRONIC SYSTEMS (HOT AND GEOTHERMAL WATER):

- A. Mains, risers, branches and connections shall be of sizes and arrangements as indicated. Provide shut-off valves in feed and return main branches and where indicated. Provide valved drains at all low points and air vents at all high points in system.

- B. The HVAC subcontractor shall provide cold-water piping from valved outlets, provided by Plumbing subcontractor, to fill hydronic systems. Provide approved combination back flow preventer and automatic feed water pressure regulator on make up water lines, Watts or approved equal.
- C. Grade piping so that when system is filled, air in mains and risers will be carried up and discharged at venting points. Feed connections shall come off bottom of mains. Provide swing loops as indicated for expansion. Changes in sizes of horizontal runs of piping shall be made with inverted eccentric fittings.
- D. Unless otherwise shown, provide for each hydronic system a self-acting pressure relief bypass between the main supply and return water piping to relief pressure when control valves close. The bypass shall consist of a piping connection two sizes smaller than the largest supply main and a pressure relief-sustaining-backpressure valve similar to Watts Series 116.

3.03 REFRIGERANT SYSTEMS:

- A. Provide all refrigerant piping required for a complete refrigeration system, with all valves fittings and specialties, etc. necessary for satisfactory operation. Installation of system shall conform to U.S.A. Standards Association B9.1 Safety Code for Mechanical Refrigeration Piping shall include adequate facilities for charging, draining and purging the system.
- B. Joints in refrigeration piping shall be brazed. The outside of the copper tube and the inside of the fitting where solder will be applied shall be cleaned and burnished with fine crocus cloth until all dirt and oxide is removed. A light coat of non-corrosive brazing flux shall be applied to both pipe and fittings. (Acid flux shall not be used). Joint shall be uniformly heated to proper brazing temperature and the brazing material appears around the pipe at the end of the fitting. The brazing material shall be a hard solder such as silver solder or Silfos. Brazing shall be done only by mechanics who are qualified for brazing refrigeration piping. Purge piping with dry nitrogen during brazing.
- C. Horizontal piping of the compressor suction and discharge lines and the condenser discharge lines shall be pitched a minimum of $\frac{1}{2}''$ in 10 feet, in the direction of refrigeration flow. Each suction gas vertical riser shall be trapped at its evaporator with a trap as recommended by the compressor manufacturer.
- D. Valves shall be designed for refrigerant services. Shut-off valves shall be brass packless type. Unions, flanged valves or fittings shall be provided for disconnecting equipment, controls, etc. for making repairs. Piping shall be run in a single layer, with each line isolated from another to prevent rubbing. Provision shall be made for expansion and contraction of piping. All piping passing through walls, partitions, etc. shall be furnished with sleeves as specified.
- E. Install refrigerant piping to prevent excessive oil from being trapped in the system. Any additional risers or equalizer lines which may be required by the manufacturer of packaged equipment for the proper functioning of the system shall be installed as part of this contract. Refrigerant piping shall be of the size recommended by the manufacturer and as approved by the COMMISSIONER.
- F. Unless otherwise noted, refrigerant piping passing through rated floors or demising walls shall be enclosed in a rigid and tight continuous fire-resisting refrigerant containment conduit or pipe duct vented to the outside or within the space served. Pipe conduit shall be copper tube Type L hard with soldered fittings or black steel Schedule 10 with screwed fittings.

3.04 PIPE SUPPORTS, HANGERS AND INSERTS

A. Support horizontal piping in accordance with the following schedule:

Pipe Size	Maximum Hanger Spacing	Rod Size
1" and smaller	6'-0"	3/8"
1 1/4" to 2"	9'-0"	3/8"
2 1/2" to 4"	10'-0"	1/2"
6" to 8"	10'-0"	3/4"
Larger than 8"	10'-0"	1"

- B. Support vertical piping with clamps attached to the pipe, resting on the floor slab. In general, one clamp for each two floors, one clamp at each floor for copper tubing. Where pipes are in open shaft, provide forged steel bar brackets to wall.
- C. Support hangers from concrete inserts, toggle bolts, or beam clamps. Furnish, locate a set such inserts and make sure that such inserts are in place when the concrete is poured. Construct inserts of malleable iron or pressed steel with space for rods of all sizes. Install all inserts for pipes 3" and larger in size with a reinforcing rod 5/8" in diameter, run through a slot in the insert specifically provided for this purpose.
- D. If any pipe has to be hung in spaces where no inserts have been provided, drill holes in the slab and provide rods and hanger attached to an approved fishplate or install 2 Star No. 7000 double expansion shields connected by a 2" x 2" angle, from which suspended the hanger rod. For pipe size 2" and under use single No. 7000 shields, but the hanger spacing defined hereinbefore reduced to 5'-0". The carrying capacity and size of each shield to be calculated on the basis of the spacing indicated above the minimum size to be 3/8". Install additional shields of the same size so that the number of hangers are of adequate size to support the loads which they carry. Shields may be used in concrete slabs only.
- E. Regardless of the type of construction (i.e., concrete, concrete-deck-steel, terra-cotta tile or other variations) take particular care to support all main lines and all large and heavy pipes in an approved manner, including the furnishing and installation of supplementary steel, if required. Submit shop drawings, indicating support methods, point loadings to the building structure and hanger locations for review sufficiently in advance of concrete pouring schedules to permit evaluation, critique and any necessary changes to handling and support methods.
- F. Set all inserts for all pipes in ample time to allow concrete work to be performed on scheduled time.
- G. Hangers may be directly bolted to steel beams of building construction, where they occur. Smaller pipes may be suspended from cross-pieces of pipe or steel angles, which in turn, to be securely fastened to building beams or hung from building concrete construction by means of rods and inserts, or hung from building terra-cotta tile construction by means of toggle bolts and rods. The intention is to provide supports which, in each case, shall be amply strong and rigid for the load, but which will not weaken or unduly stress the building construction.
- H. Provide approved roller support, floor stands, wall brackets, etc. for all lines running near the floor or near walls, which can be properly supported or suspended by the floors or walls, which can be near walls may also be hung by hangers carried from approved wall brackets to a higher level than the pipe.
- I. Do not hang piping from other piping. Support of hangers by means of vertical expansion bolts is not permitted.

- J. Whenever hangers using pipe rolls are used provide approved steel pipe covering protection saddles, spot welded to the piping at each hanger location.
- K. Anchor piping where required to localize expansion or to prevent undue strain on piping and branches. Anchors to be entirely separate from hangers and of heavy forged or welded construction of approved design. All anchor designs, when submitted for approval, to include piping reactions which respective anchors are capable of supporting. Provide all indicated or required expansion loops.
- L. Support all line of copper tubing individually by approved type hangers not more than 6' apart, or as shown on the drawings. Hangers for Uncovered Tubing: Broad straps fitting outside of covering.
- M. Hangers for cold piping to support the pipe without piercing the insulation. Use insulation shields to protect the insulation on cold pipes. Weld insulation protection saddles to insulated hot pipes at roller supports. Wherever fibrous glass pipe insulation is installed install calcium silicate of equal thickness in lieu thereof wherever hangers and insulation shields shall bear only on an insulation material which is of such density that it will not compress, crush or deform.
- N. This may coordinate with other s to use common means of support. Submit for approval all pertinent design data relating to the support as well as verification of the responsibility for the support.
- O. Support vertical water piping at approximately the mid-height of the riser (unless otherwise indicated) using a clamp, installed so that expansion and contraction does not cause trapping of air or prevent drainage.
- P. For piping 4" and larger, support the elbows of the piping adjacent to the pumps with steel supports from the floor, and from the inertia base where pump is on such a base, to prevent loading heavy weights of piping on pump casings.

3.05 SLEEVES

- A. Provide sleeves for all pipes passing through floors, walls or partitions, hung or furred ceilings, etc. (of sufficient diameter to accommodate pipe covering where such is required). Set sleeves for concrete floors, walls and other masonry work in place so that space all around the pipes, after the pipes are installed in place, are about equal.
- B. Protect pipes passing through floors with membrane waterproofing and roofs with Schedule 40 pipe extensions (not sheet metal) and provide "Zurn Z-197" or "Josam 1880" with cast iron integral flashing flange and clamping ring waterproof type pipe sleeves. For membraned floors, fill void between sleeve and pipe with mineral wool and then seal the top with mastic to prevent sound transmission. Sleeves for Penetrations of the Metal Deck (where applicable): Nail, Cut or drill the metal deck after the deck is poured. Set sleeves in such a manner so that no concrete fills their interior during the concrete pouring and screening operations.
- C. Sleeves for Reinforced Concrete Walls and in Concrete Beams: Standard weight galvanized steel pipe with anchor flanges. Sleeves through Toilet Rooms and any other such Wet Area Floors: Iron pipe size brass. Caulk floor sleeves for exposed pipes watertight and project approximately 2" above the finished floor so that the plate will properly fit over the same. Finish sleeves flush with the bottom of slab and also with the finished faces of wall.

- D. Provide sleeves with an inside diameter at least 1/2" greater than out-side of pipe served, including pipe insulation which must be continuous through sleeve.
- E. Use LINK-SEAL, Fernco, GPT or approved equal for pipes and sleeves in exterior walls, foundation walls and pits. Where piping penetrates walls (other than foundation walls), partitions, floor slabs, etc., pack space between piping and sleeve with mineral wool.
- F. Do not support pipes by resting clamps on sleeves. Clamps must extend beyond sleeve and be supported outboard of sleeve in an approved manner.
- G. Provide escutcheon plates of the proper size for all piping in sleeves passing through walls, furrings, partitions, hung ceilings, etc. throughout the building where exposed to public and/or tenant view. All exposed escutcheons of cast brass, bell type, with set screws and chromium plated and of sufficient diameter to include any required pipe insulation.
- H. Provide counterflashing for all piping passing through waterproof wall or roof construction consisting of steel rainhood welded all around to pipe and overlapping flashing.
- I. Where space for future pipe and conduits is required, provide sleeves and fill with lightweight concrete.
- J. Firestopping and grouting around pipes and ducts through concrete slabs and walls, and masonry walls with Portland cement grout in the sleeved opening extending full depth through wall or floor slab, with sheet metal over the insulation before grouting in. Around pipes and ducts through drywall construction wrap mineral rope and finish with sheet metal collar on ducts and escutcheons on pipe. Attach escutcheons to wall, not pipe. Use at all fire-rated walls and floors.
- K. Where piping penetrates mechanical room floor slabs provide 4" concrete curb around pipe penetrations.

3.06 VALVES

- A. No valve shall be installed with stem pointing down below the horizontal without the approval of the COMMISSIONER.
- B. Install valves so that they are accessible for repacking. Install with operating clearance for handle and stem.
- C. On equipment isolation valves install so that valve and piping do not interfere with equipment removal or maintenance. Install unions or flanges on equipment side of valves unless valve is flanged type.
- D. Provide valves of a design permitting packing while open and under pressure.
- E. Provide shutoff valves in supply and return to reach item of equipment such as pumps, tanks, coils, traps, automatic valves and similar items. Valves shall be suitably located to isolate each unit to facilitate maintenance or removal of all equipment and apparatus. Valves 2 1/2" and larger shall be flanged 2" and below shall have a union installed between valve and equipment.
- F. Provide a gate valve in the common supply line and an individual combination balancing/shut-off valve and flow measuring station in the return line from each water coil, and all water using heat transfer elements.
- G. Provide a gate valve on supply risers near main and a combination balancing/shut-off valve and flow measuring station in each return riser near main.

- H. Provide drains at low points of all liquid piping systems including each riser. Locate drain valves in Mechanical Equipment Rooms not higher than 6' above floor and pipe to nearest floor drain. Provide capped drain cocks with threaded ends for hose connections at all other drain points. Provide one 100' length of heavy duty 1" hose.
- I. Provide all valves 8" and larger with a rating of over 150 lbs. with a 1" bypass valve of same pressure rating as the bypassed valve.
- J. Provide renewable bronze seat rings and bronze spindles for all cast iron body valves.
- K. Use combination balancing/shut-off valve and flow measuring station for all throttling service, and where noted on the drawings.
- L. Provide lubricated tapered plug cocks with the manufacturer's proper lubricant for water service before shipment to the job site. Furnish four (4) hand wrenches for each size valve, where gear operators are not required.
- M. Butterfly valves of the lug type are permitted in lieu of valves indicated above for chilled water, condensing water and hot water services only. 150 lb. construction with totally enclosed weather-proof operator replaceable packing bonnet and material combination as follows: Iron body, stainless steel stem and disc, steel ring and Buna seat.
- N. Safety valve discharges shall be piped and extended through the roof. At the bottom of the riser provide a drip pan elbow. From the drain and the elbow provide a common 3/4" drain line extended to discharge down 6" above the nearest floor drain.
- O. Provide chain-operated sheaves and chains where indicated on drawings and for all valves which are more than 6' above the floor in Mechanical Equipment Room.
- P. Provide all other hand valves, check valves, cocks, etc., as required for the complete and proper valving of the entire installation.

3.07 WELDING

- A. Welding Process: All welding shall be done by the oxyacetylene or electric arc welding process in accordance with the requirements set forth in Welding or Pipe Joints of the ASME Code for Pressure Piping.
- B. Beveling and Welding: All steel pipe 2 1/2" and larger may be purchased mill beveled or shall be machine beveled on both ends before welding. On odd lengths of pipe, beveling may be accomplished by means of the oxyacetylene cutting torch providing all paint, rust, scale and oxide are carefully removed with hammer, chisel or file. Joints shall be prepared and welded to assure thorough fusion with bare metal, complete penetration, maintenance of alignment, and the production of a joint that shall develop the full strength of the pipe and shall be leakproof in service.
- C. Welding Rods: The welding rod used for welding shall be Oswald No. BT or approved equal.
- D. All foreign matter shall be removed from the ends of pipe lengths before tacking and welding. Pipe lengths shall be lined up straight and abutting pipe ends shall be concentric. Spacing and tack welding shall be such as to prevent the pipe from lapping or getting out of alignment during welding operation.
- E. All welding shall become in accordance with the latest accepted practice applicable to the particular service and shall be performed only by welders who have been tested and qualified in accordance with the requirements of the ACA Piping Code for Welding. The shall furnish a certificate for each

welder, certifying that the welder complies with these Specifications and of the National Certified Pipe Welding Bureau.

- F. All welded pipe connections shall be painted in an approved rust inhibitor ("extend" by Permatex or equal) prior to insulating.
- G. Welders shall be licensed by New York City Department having jurisdiction to issue licenses.
- H. The welding of high pressure piping shall be tested in accordance with Section MC 1210.4 of the New York City Mechanical Code and require Special Inspections in accordance with Section BC 1704.17 of the New York City Building Code.

3.08 STRAINERS

- A. Provide approved self-cleaning strainers in inlet connections to each feeder and make-up connection, each automatic control valve and all automatic devices whose proper functioning would be affected by solids in the fluid.
- B. Except as noted, strainers in water lines to be Y-pattern set in a horizontal (or vertical downward) run of the pipe. Where it is not feasible, strainers may be of enlarged cross-section flat type. In all cases, arrange strainers as not to "trap" pipes, and to facilitate disconnection and opening-up for cleaning.
- C. Provide approved valved dirt blowout connection for each strainer. Each valve located at hand-height and piped to the nearest floor drain, at a point where there is no risk of flooding or damage.
- D. Clean the strainers as necessary until accepted by the City of New York.
- E. Install strainers upstream of automatic control valves with the same size as the inlet pipe serving the control valve.

3.09 AIR VENTS

- A. Provide soft temper copper tube pigtail on manual vents so that end can be placed over a bucket.
- B. Provide all manual air cocks and automatic air vents required throughout the water circulating system for the removal of air, of ample strength for the pressure to which they will be subjected. Provide automatic air vents at all high points.
- C. Provide air vents of the compression type, all bronze construction, key operated. Provide each heat transfer element supplied with water with not less than 1/2" manual air vent. Furnish ten (10) keys. Provide air chambers where indicated.
- D. Use inverted ball float traps for vent water risers, mains and branches and where required. Trap Size: 3/4" with inlet and overflow connections, both valved.
- E. Provide manual air vent valves in the piping connections to each hot water heating coil and each chilled water coil (both supply and return where such are not automatically vented). Provide a 1/4" vent line from each air vent to nearest floor drain, or as directed, to suit job conditions.
- F. Provide gate valves with capped bibb connections at all drain points. Hose bibbs only will not be acceptable. Install capped drains at all low points of the systems. Threads of hose bibbs to fit standard rubber hose connection.

3.10 SENSOR PIPE WELLS

- A. Provide sensor wells in piping system for automatic temperature controls.
- B. In Victaulic grooved piping systems, seismic motion shall be accommodated by installing swing joints consisting of flexible couplings, pipe nipples and elbows that provide simultaneous movement in all directions, or other seismic movement compensation devices such as loops, offsets, or Style 155 expansion joints (when an in-line device is required) to provide flexibility to the system and help reduce pipe stresses. Refer to Victaulic design submittal #26.12.

3.11 SEISMIC REQUIREMENTS

- A. Piping systems which are required by code to be seismically supported shall be supported and properly braced in accordance with 2014 New York City Building Code. Transverse and longitudinal bracing shall be provided as per 2014 New York City Building Code.
- B. Seismic plans and calculations shall be prepared and signed by a Professional Engineer with experience in seismic design.

3.12 PIPING SYSTEM TESTS-GENERAL

- A. Each piping system shall be tested prior to being concealed and prior to application of insulation, painting or placing of backfill. Testing as stipulated herein shall be considered minimum, and where tests stipulated the City of New York exceed these requirements, such more stringent tests shall be performed.
- B. All materials and equipment for testing shall be furnished by the installer of the system. Concealed work shall remain uncovered until required tests have been completed. In the event that the project construction schedule requires it, make arrangements and insert proper sectionalizing devices so that a portion of a system may be tested.
- C. All piping, unless otherwise specified, shall be tested to a hydro-static pressure at least 2 ½ times the maximum designed working pressure (but not less than 50 psig) for a sufficiently long time to detect all leaks and defects, and after testing, shall be made tight in the most approved manner.
- D. Where controls and accessories are not designed to withstand pipe test pressures, they shall be properly protected against damage during such tests.
- E. Compressed air piping for temperature control line shall be subjected to an air pressure test of 50 psig and connections checked with soap suds.
- F. If in any tests leaks are observed, the defective work or material shall be replaced. No caulking of screw joints or holes will be acceptable. Repetition of the entire test will be required as many times as leaks can be observed from the tests, until no leaks result in successful completion of the test.
- G. Make all provisions for removal of test equipment and draining of pipes after tests have been completed. Insulation work shall not be performed prior to inspection and testing of piping.
- H. The contractor shall inform the COMMISSIONER in writing when a section of piping is to be tested and subsequently insulated or otherwise concealed. Such notice shall be given a minimum of five (5) working days prior to the start of testing.

- I. Where possible, arrange to conduct tests under constant ambient temperature conditions in order that compensation for temperature change is not necessary.

3.13 PIPING SYSTEM TEST - HYDRONIC SYSTEMS (HOT AND GEOTHERMAL WATER)

- A. All equipment and piping shall be thoroughly cleaned of iron cuttings and other refuse during assembly and installation.
- B. Pressure tests shall be performed on all piping before equipment is hooked up to the piping.
- C. Before testing piping systems, remove or otherwise protect from damage control devices, air vents, other parts which are not designed to stand pressure used in testing piping.
- D. Test welded piping systems, under 100 psi pressure (air) with soap suds.
- E. After air tests have been performed and all leaks repaired, test piping hydrostatically to one and one half times the maximum working pressure, but in no case to less than 150 psi. Hydrostatic test pressure shall remain constant without pumping for at least two (2) consecutive hours.

3.14 PIPING SYSTEM TEST - REFRIGERANT SYSTEMS

- A. Test refrigerant piping for tightness and leaks under pressure and vacuum. The duration of each test shall be twenty-four (24) hours.
- B. Prior to test isolate all equipment, coils, controls, fittings, etc., not rated for test procedure.
- C. Test joints by filling system with refrigerant at 5 psig and inspecting each joint with a Refrigerant Leak Detector.
- D. There shall be no observable leaks or changes in pressure. If either is observed, seal leaks and repeat test procedures.

END OF SECTION

SECTION 23 2500 - HVAC WATER TREATMENT

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) DDC General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Water Treatment and Chemical Cleaning as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Geothermal
 - 2. Hot Water
 - 3. Refrigerant

1.03 QUALITY ASSURANCE

- A. Mechanical equipment, cleaning chemicals, treatment chemicals, control equipment and services by a single water treatment consulting firm for undivided responsibility.

1.04 SUBMITTALS

- A. Shop Drawings: System installation drawings, wiring and piping diagrams and sequence of operation.
- B. Product Data:
 - 1. For each component, device, pump, time clocks, storage tanks, controller, valve etc.
 - 2. Chemical products being supplied, including cleaning chemicals.
- C. Test Report:
 - 1. Obtain analysis of raw water from the City water.
- D. Manufacturer's Instructions:
 - 1. Recommended feed rates of each chemical product.
 - 2. Recommended operating conditions for each system including cycles of concentration, chemical test limits and limits of water treatment system set points.
 - 3. Certificate of Cleaning: By the cleaning chemical supplier.

1.05 CHEMICAL SUPPLIES

- A. Provide adequate chemicals for pipe cleaning and pretreatment.
- B. Provide chemicals for one year of operation.

1.06 SURVEILLANCE PROGRAM

- A. Provide for one year of consulting surveillance inspections and water treatment services with check-analysis procedures once each month.
- B. Field Surveillance Inspection: Visit site and review field test procedures and water control reports, inspect chemical feeding equipment and recommended modifications to program necessary to improve results.
- C. Field surveillance inspection and check-analysis procedure shall be supported by written report sent to the Construction Manager.
- D. Commence surveillance with start-up of system and continue for one calendar year.
- E. End surveillance with lay-up program including corrosion protection of open systems.

PART 2.00 - PRODUCTS

2.01 MATERIALS

- A. Chemical Cleaning and pretreatment:
 - 1. Provide all dispersants, scale inhibitors and corrosion inhibitors as required for cleaning and treating all piping systems. Chromates shall not be used.
- B. Water Treatment:
 - 1. Provide all biocides and biodispersants as required to treat water systems for the prevention of microbiological growth. Chromates shall not be used.
 - 2. Provide a Venturi chemical feed fitting and system for each system to be treated. Fittings shall be Nalco bioductor or approved equal.
 - 3. Provide all controls and equipment required for an automatic bleed and chemical feed system.

PART 3.00 - EXECUTION

3.01 CHEMICAL CLEANING AND PRETREATMENT

- A. Flush piping systems with the approved cleaning chemicals to remove pipe dope, slushing compounds, cutting oils and other loose extraneous materials. Seal ends after cleaning.
- B. The chemical supplied shall:
 - 1. Satisfy the proper feed rates.
 - 2. Check that the cleaning solution is actually in each system.
 - 3. Satisfy when to flush the system.
 - 4. Check each system following flushing to ensure cleaning chemicals have been removed from each system.

- C. Block modulating valves, zone valves and other system restrictions.
- D. Provide portable pumps to circulate water for cleaning purposes at respective flows for four (4) hours. Remove and clean strainers. Blow off low points with steam after cleaning and before traps are installed. Drain entire system.
- E. Chemical used for cleaning of systems shall comply with the recommendations of the manufacturers of the major components in the system and shall be approved for use.
- F. Upon initial fill (following system flushing) the approved chemicals which provide a protective coating to prevent oxidation of the cleaned system shall be added.

3.02 WATER TREATMENT

- A. Install water system including piping and wiring in accordance with manufacturers instructions.
- B. After chemical cleaning and pretreatment of piping systems, analyze water systems to determine specific biocides and inhibitors to be used.
- C. Add the necessary blend of inhibitors, biocides and dispersants for proper control of corrosion, scaling and microbiological growth. Submit in writing the recommended feed rate of all chemicals and bleed rate of all systems.
- D. Deliver and install all chemicals needed for one year service.

3.03 FIELD QUALITY CONTROL

- A. Instruct maintenance personnel in the operation of systems installed. Secure written confirmation that instruction has been provided.
- B. Perform field test procedures and issue reports of such test.

3.04 EQUIPMENT INSTALLATION

- A. Install all equipment specified herein in accordance with manufacturers instruction.

END OF SECTION

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SECTION 23 3113 METAL DUCTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements
- D. Ductwork, fittings, dampers and accessories shall be suitable for the pressure and temperature of device.
- E. Ductwork design drawings are diagrammatic to indicate design intent. The Contractor shall be responsible for establishing grades and elevations, checking of all interferences, providing all fittings, whether or not shown, required accommodating changes in direction or elevation and as necessary to accomplish the intent of the drawings. The Contractor shall verify size and locations of all ductwork in the field prior to the start of installation of equipment and ductwork. The Contractor shall, at his expense, perform all minor rerouting of ductwork around obstructions from new or existing construction whether or not such conditions are indicated on the plans. Minor rerouting of ductwork is defined as any rerouting which requires less than 10 linear feet of additional ductwork (measured along the centerline or its equivalent in fittings) over the above that shown on the drawings in order to avoid an obstruction. Such rerouting shall be performed with ductwork of size equal to that shown in the original rerouting. Whenever an obstruction requires more than a minor rerouting as defined above, the Contractor shall report the condition to the COMMISSIONER prior to the start of ductwork on the effected system. The Contractor shall be responsible for neglect of checking all elevations, clearances, dimensions and locations of ductwork systems prior to the start of work on same.
- F. For specified systems and medium and high-pressure ductwork operating at static pressures in excess of 3 inches, Contractor shall test ductwork and related components for air leakage in accordance with the SMACNA HVAC Air Duct Leakage Test Manual as specified herein.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Sheet Metal Ductwork as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Sheet metal ductwork and plenums.
 - 2. Access doors in sheet metal work and ceiling.
 - 3. Dampers.
 - 4. Flexible connections.

1.03 RELATED WORK

- A. Insulation.
- B. HVAC Equipment.
- C. Grilles, Registers and Diffusers.
- D. Automatic Temperature Controls.
- E. Testing and Balancing.

1.04 QUALITY ASSURANCE

- A. SMACNA.
- B. ASHRAE.
- C. NFPA.
- D. UL.
- E. Comply with requirements of all governing authorities having jurisdiction.

1.05 SUBMITTALS

- A. Shop drawings 3/8" scale, showing ductwork layout indicating duct sizes, field dimensions, elevations, fittings, dampers and conflicts with other trades. Shop drawings shall include all vertical duct risers, offsets and section views as required to illustrate all sections of ductwork.
- B. Sheet metal shop standards including construction details, gauges, hanging details, volume dampers, fire dampers, combination fire/smoke dampers, acoustic lining and all related installation requirements and details.
- C. Test Reports: Field testing of air outlet flow.
- D. Samples, when requested.
- E. As-built AutoCad drawing files or reproducible mylar after job completion.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings by installing temporary closure pieces or shrink-wrap on open ends.
- B. Where possible, store ductwork inside and protect from weather. Insulation and acoustic material either loose or installed within ductwork or equipment can absorb damaging moisture and become soiled if left outdoors prior to being installed. Absorbed moisture can foster biological growth and can lead to indoor air quality problems at a later date. Where necessary to store outside, store above grade. To minimize damage all such material or equipment stored outdoors shall be shrink-wrapped prior to shipment to the project. The shrink-wrap shall only be removed once the materials and equipment have been move into enclosed spaces within the building.

PART 2 PRODUCTS

2.01. GENERAL - DUCTWORK AND ACCESSORIES

- A. All ductwork, plenums, dampers and all auxiliary work of any kind, necessary to make the various air conditioning, ventilating and heating systems complete and ready for operation, shall be provided.
- B. The sheet metal work shall be fabricated and installed in accordance with SMACNA Duct Construction Standards and the ASHRAE Handbook. The SMACNA and ASHRAE recommendations shall be considered as mandatory requirements.
- C. The duct system shall comply in strict accordance with NFPA 90A, NFPA 96, the New York City Building Code, New York City Mechanical Code and the ECCCNY (ASHRAE 90.1-2010).
- D. Furnish and install, in an approved workmanlike manner, all the sheet metal work indicated on the drawings and specified herein and required for the heating, ventilating and air conditioning systems. All ductwork indicated on drawings is schematic. Therefore, changes in duct size and/or location shall be made where necessary to conform to space conditions, without additional cost to the City of New York.

- E. Ductwork shall be constructed of galvanized sheet metal unless otherwise noted.
- F. Construct all longitudinal joints with Pittsburgh type seams. A snap lock seam shall not be permitted as a substitute for the Pittsburgh lock at corners of ducts unless factory assembled or if shipped knocked down joints are sealed with duct seal and ends of each section are riveted.
- G. All ducts shall be true to dimensions indicated, and dimensions shall be clear inside dimensions unless otherwise specified. Dimensions given on drawings of all acoustically lined ducts shall be the clear inside dimensions. Smooth transitions shall be installed where acoustic lining ends and non-lined duct begins. Ducts shall be straight and smooth on the inside with neatly finished joints.
- H. Shape all changes in direction, both horizontal and vertical, to permit the easiest possible air flow, using full sized bends wherever possible. All short radius elbows where the center line radius is less than 1 1/2 times duct width and square corner elbows shall be fitted with directional flow air turning vanes on both supply, return, intake and exhaust systems.
- I. Fresh air intake plenums and exhaust plenums shall be made watertight at all bottom seams and up to 12" on bottom seams by soldering. Where plenums connect to louvers the bottom pans shall pitch down toward the louver. When bottom pan of plenum connects to drain outside, a 1" drain connection shall be fitted at the lowest point in the bottom pan.
- J. Fresh air plenums, exhaust plenums and mixed air plenums shall be constructed of 16 gauge galvanized steel for ducts 85" and larger and 18 gauge for 84" and smaller.

2.02. INDUSTRIAL DUCTWORK (Wood Shop)

- A. All ductwork, plenums, dampers, and all auxiliary work of any kind necessary to make the various ventilation and exhaust systems complete and ready for operation shall be provided.
- B. The sheet metal work shall be fabricated and installed in accordance with SMACNA Round Industrial Duct Construction Standards and SMACNA Rectangular Industrial Duct Construction Standards.
- C. Ducts shall be constructed of black iron welded or flanged and gasketed. Double locked seams shall not be used.
- D. Metal thicknesses for general ventilation, make-up, exhaust, air conditioning, and mildly abrasive industrial exhaust shall be:

<u>Diameter of Straight Ducts</u>	<u>Thickness (Gauge)</u>
4" to 8"	16
8" to 18"	14
18" to 30"	12
Over 30"	10

- E. Longitudinal joints or seams should be lapped and riveted or spot welded on 3" centers maximum.
- F. Girth joints except welded or flanged should be made with an inner lap in the direction of flow of 1 1/2" and riveted or spot welded on 4 1/2" centers, with not less than four (4) rivets for any such lap joint.
- G. Elbows and bends should be a minimum of two gauges heavier than straight lengths of equal diameter and have a centerline radius of at least 1 1/2 and preferably 2 1/2 times the pipe diameter.
- H. Elbows of 90° should be five-piece construction for round duct up to 6" and seven-piece for larger diameters. Bends of less than 90° should have a proportional number of pieces. Prefabricated elbows of smooth construction may be used.

- I. All branches should enter the main at the large end of the transition at an angle not to exceed 45° with 30° preferred. Connections should be on the top or side of the main with no two branches entering at opposite sides.
- J. Transitions in mains and submains should be tapered. The taper should be at least five (5) units long for each one (1) unit change in diameter.
- K. Cleanout should be provided in horizontal runs of duct carrying dust-laden air, and especially near elbows, junctions and vertical runs. The spacing of cleanout doors should not exceed 12' for ducts of 12" diameter and less but may be greater for larger duct sizes.
- L. Provide trapeze type duct hangers spread at a maximum of 4' on center.
- M. Where condensation may occur, the duct system should be liquid tight and provision made for proper sloping and drainage.
- N. For industrial exhaust systems provide trapeze type duct supports of sufficient capacity to carry the weight of the system if half filled with material and to place no load on the connecting equipment. See SMACNA Standards (Ref. 138 and 139).
- O. The duct system shall comply in strict accordance with NFPA 90A and the New York City Building Code.

2.03. GALVANIZED SHEET METAL

- A. Galvanized sheet metal shall comply with ANSI/ASTM A527, lockforming quality, with ANSI/ASTM A525, G90 zinc coating; mill phosphatized for exposed locations.

2.04. ALUMINUM (Dryer)

- A. Where indicated, provide aluminum sheet complying with ANSI/ASTM B209, Alloy 3003, Temper H14.

2.05. BLACK IRON (CARBON STEEL)

- A. Where indicated, provide black carbon steel sheet complying with ANSI/ASTM 415.

2.06. LOW PRESSURE DUCTWORK

- A. Low-pressure ductwork shall conform to the latest SMACNA "Low Pressure Duct Construction Standards."
- B. Low pressure ductwork shall be defined as all duct with velocities less than 2,500 fpm and static pressures of 0" to 2" [positive or negative].
- C. Ducts with static pressure ranging from 0" to 1" w.g. shall be provided with a Class A seals, Leakage Class 6, however, all joints must be sealed. Seal classification shall be as described in the SMACNA tables. Type and method of sealer shall be as described in this section of specifications.
- D. Where round ductwork is indicated to be acoustically lined, provide double wall insulated.

2.07. EXPOSED DUCTWORK

- A. Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections, including pitting, seam marks, roller marks, oil canning, stains and discolorations, and other imperfections, including those which would impair painting.
- B. Provide flat type seams and joints for all exposed duct construction.
- C. For circular ductwork, Spirapipe shall be used. Where indicated to be acoustically lined, provide double wall insulated.

2.08. HIGH PRESSURE DUCTWORK (nederman system)

- A. High-pressure ductwork shall conform to the latest SMACNA "High Pressure Duct Construction Standards".
- B. High-pressure ductwork shall be defined as all ducts with air velocities exceeding 2,000 fpm and positive pressures from 6" w.g. to 10" w.g.; and with velocities up to 4000 FPM and positive pressure or negative pressure exceeding 3".
- C. All joints shall be made with companion bolted angles 1/8" neoprene gaskets, which are shop fabricated and minimum machine attached to ductwork. Duct systems such as Ductmate, K-Lock, Nexus or approved equal.
- D. Ducts shall be provided with Class A Seals as described in the SMACNA manual. Type and method of sealer shall be as described in the section of specifications.

2.09. KITCHEN EXHAUST DUCTWORK (COMMERCIAL COOKING KITCHENS)

- A. Ducts serving Type I kitchen exhaust hoods shall be constructed as follows:
 - 1. Ducts up to and including 155 square inches – No. 16 gauge steel.
 - 2. Ducts over 155 square inches, but less than 200 square inches – No. 14 gauge steel.
 - 3. Ducts equal to or more than 200 square inches – No. 12 gauge steel.If stainless steel ductwork is used for any of the above listed sizes, the gauge steel may be increased upwards by 1 gauge.
- B. All exterior ductwork shall be constructed of No. 18 gauge stainless steel. At the base of duct and at the termination point shall be a permanently installed sign identifying the facility from which the duct originates.
- C. Continuously weld or braze all longitudinal joints, transverse joints, seams, penetrations, and duct to hood collar connections. All welds to be external and liquid-tight. Duct joints shall be butt joints or overlapping joints. Overlapping joints shall be installed to prevent ledges and obstructions from collecting grease or interfering with gravity drainage to intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed 1/4 inch. The length of overlap shall not exceed 2 inches.
- D. Provide 20" x 20" liquid-tight access doors; mounted on the side of the duct, at 20 foot intervals for the entire length of horizontal duct and at every change of direction. For vertical ducts, provide access door at base and top of riser, at the top of the riser, and on each floor. Provide access doors on each side of exhaust fan within 3 feet of fan.
- E. Ducts shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than 2% towards the hood or approved grease reservoir or duct sump. Where horizontal ducts exceed 75 feet in length, the slope shall not be less 8.3% (one in twelve).
- F. Provide a residue trap at the base of each riser with provisions for a cleanout in accordance with NFPA 96.

- G. Prior to the use or concealment or wrapping of any portion of grease duct, a leakage test shall be performed in the presence of a special inspector in accordance with NYC Buildings Bulletin 2010-021. A light test shall be performed to confirm that all joints are liquid tight. The test shall be performed by passing a 100 watt (minimum) lamp through the entire section of grease duct. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The ductwork shall be permitted to be tested in sections, provided that every joint is tested.
- H. A performance test shall be conducted upon completion and witnessed by a representative of the FDNY prior to final approval of the exhaust and make-up air systems. The test shall be performed in accordance with 2008 New York City Mechanical Code, Section MC 507.16. The test shall verify the rate of exhaust, make-up air and proper operation as herein specified. The contractor shall coordinate and schedule with the FDNY and provide all necessary test equipment and required devices required to perform the test.
- I. Prior to the use or concealment or wrapping of any portion of grease duct, a leakage test shall be provided in accordance with 2012 International Mechanical Code, Section 506.3.2.5. A light test shall be performed to confirm that all joints are liquid tight. The test shall be performed by passing a 100 watt (minimum) lamp through the entire section of grease duct.
- J. A performance test shall be conducted upon completion and prior to final approval of the exhaust and make-up air systems in accordance with 2012 International Mechanical Code, Section 507.16. The test shall verify the rate of exhaust, make-up air and proper operation as herein specified. The contractor shall provide all necessary test equipment and required devices required to perform the test.

2.10. DOMESTIC CLOTHES DRYER EXHAUST DUCTWORK

- A. All clothes dryer exhaust ductwork shall be fabricated of a minimum 24 gauge aluminum sheet metal of a minimum nominal size of 4" in diameter and shall have a smooth interior finish.
- B. The entire exhaust system shall be supported and secured in place. The male end of the duct at overlapped duct joints shall extend in the direction of airflow.
- C. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction.

2.11. DOMESTIC CLOTHES DRYER LINT TRAPS

- A. Provide lint traps for each type of clothes dryer used on project.
- B. Side-by-side washer/dryer:
 - 1. Lint traps shall be fully recessed type with filter frame attached to a removable see-through access door. Access door shall be fully gasketed with two latches making it completely airtight.
 - 2. Lint trap shall be Model LT-250-45 as manufactured by Reversomatic Manufacturing Ltd, Model DBLT4W as Manufactured by Fantech, LT-100 as Manufactured by Soler and Palau or approved equal.
- C. Stackable washer/dryer:
 - 1. Lint trap shall be dryer mounted or ceiling mounted.
 - 2. Lint trap shall include 38 square inch stainless steel filter screen, see through door and locking door latch.
 - 3. Lint trap shall be Model LT400SD as manufactured by Reversomatic Manufacturing Ltd, Model DBLT4W as Manufactured by Fantech, LT-100 as Manufactured by Soler and Palau or approved equal.

2.12. CONDENSING HEATING VENT

- A. SCIL Secure Seal shall be manufactured from AL29-4C stainless steel or equivalent, a super ferritic stainless steel specifically designed for extreme resistance to chlorine ion pitting.

crevice corrosion, and stress corrosion induced by the generation of corrosive condensates by partially or fully condensing natural gas or propane fired heating appliances.

- B. The system components, supports and terminations shall be the product of one manufacturer, shall be fully factory fabricated, shall be laboratory tested and listed by Intertek Testing Services (ETL) for use with building heating equipment, burning gas as described in NFPA 54 and be listed to UL 1738 I ULC S-636 and UL-641 I ULC-S609.
- C. The complete Breeching/Chimney system shall be fabricated as follows
 - 1. Inner Wall
 - a. 1/2 inch to 12 inches diameter: 0.020 thick, AL29-4C Stainless Steel or equivalent.
 - 2. Outer Wall (with Secure Seal SSD/SSID)
 - a. 1/2 inch to 10 inch diameter: 0.020" thick, 441 stainless steel or equivalent.
 - 3. Insulation (with Secure Seal SSD) Annular 1" air space between walls
 - 4. Clearances to combustibles.
 - a. Double Wall Secure Seal SSD/SSID (Minimum Clearance fully Enclosed 4 sides):
 - 1. Sizes 3 inches to 24 inches diameter: 1 inch vertical
 - b. Double Wall Secure Seal SSD (Minimum clearance unenclosed, 2 sides max):
 - 1. Sizes 3 inches to 12 inches diameter: 1 inch horizontal, 1 inch vertical
- D. The Breeching/Chimney shall be guaranteed by the manufacturer to be free from defects due to faulty material or workmanship for a period of 1 year minimum. Terms and conditions for the guarantee shall be as stated in the manufacturer's standard guarantee which must be included with submittal drawings.
- E. The complete Breeching/Chimney System, from appliance outlet to chimney, shall be designed to eliminate on-site welding through the use of a slip fit, rigid connection with reinforcing ribs, built in mechanical locking clips and a Viton O-ring seal. Silicone gaskets are not allowed due to adverse reactions with sulphuric and carbonic acids. The use of silicone caulking at section joints is also not allowed.
 - 1. The system, when sealed, shall maintain airtight integrity at pressures up to 35 inch of water column and be listed for an internal static pressure of 6 inches of water column at 550°F.
 - 2. Horizontal spacing between guides and supports shall be approved for 12 feet.
 - 3. Vertical free standing height above the roof shall be approved for 10 feet.
- F. Detailed manufacturer's submittal drawings shall be provided for approval prior to manufacture or installation of the breeching system.
- G. Breeching shall be manufactured by Security Chimney, Metalbestos, Van Packer or approved equal.

2.13. HIGH-EFFICIENCY BOILER COMBUSTION AIR INLET PIPE

- A. Vent shall be constructed of stainless steel.
- B. Vent shall be U.L. listed for Type B applications.
- C. Seams shall be sealed with U.L. listed silicon sealant.
- D. Supports shall be per manufacturer's recommendations.

2.14. VOLUME DAMPERS

- A. Provide all dampers required for all systems to accomplish the intent of the drawings and specifications. Dampers are to be installed in frames properly caulked to prevent leakage.

- B. Provide manual balancing dampers as required to properly balance the air distribution system. If location of balancing dampers is not defined on the drawings, the following minimum standards shall govern:
1. All supply air main branches from trunk, each split, and all subbranches from mains shall have balancing dampers.
 2. Exhaust and return main branches from trunk, each split and all subbranches from mains shall have balancing dampers. Balancing dampers shall not be installed in kitchen exhaust, fume hood exhaust, or breeching unless otherwise indicated.
 3. Locate damper as far as possible from air outlet to avoid noise transmission.
 4. Provide and/or coordinate with General Contractor for easy access to damper, or otherwise furnish remote damper actuator.
 5. If damper is not accessible, or is located above a plaster, drywall or millwork ceiling, provide a remote damper actuator and damper as manufactured by Young regulator Model 896-C with No. 1200A right angle worm gear and Model 820 respectively or approved equal.
- C. Splitter dampers shall not be used. Use opposed blade dampers after all splits for balancing.
- D. Opposed blade dampers shall be a minimum of 5" deep and fabricated of 14 gauge galvanized steel blades with an 11 gauge galvanized steel frame. Blades shall have opposed action and shall ride in bronzed bushings on 1/2" steel shafts. Damper blades shall be operated by a common linkage. Units shall be Model CD-400 as manufactured by Louvers and Dampers or approved equal. Manual operated dampers shall have a quadrant-locking device.
- E. Single blade dampers shall not be used for balancing unless otherwise shown.
- F. Parallel blade damper shall be of the parallel blade type with 14 gauge galvanized steel blades and 11 gauge galvanized steel frame. Blades shall ride on bronze bushings with 1/2" stub aluminum shafts. Blades shall be connected by a common linkage. Units shall be as manufactured by Louvers and Dampers, Model CD-500, or approved equal.

2.15. FIRE DAMPERS

- A. Fire dampers shall be installed in all rated construction and as shown on the drawings.
- B. Fire damper shall be of the folding blade type, Fire/Seal as manufactured by Air Balance, Inc., or equivalent and shall bear the Underwriters' Laboratories label. Dampers shall meet the requirements of NFPA Bulletin No. 90A and shall be tested in accordance with UL 555.
- C. Fire damper blades shall be located outside of the air stream.
- D. The number of damper sections and location of doors for access to fusible links shall be approved by the COMMISSIONER prior to construction.
- E. End connections to the damper section shall be of the breakaway type to prevent the damper from being pulled out of the wall by a duct failure.
- F. Fire dampers shall be manufactured by Ruskin or approved equal.

2.16. FLEXIBLE CONNECTIONS

- A. Provide flexible connections to all supply and exhaust fans to prohibit the transfer of vibration from fans to connecting ductwork. Flexible connections shall comply with UL 181 (Class 0 or Class 1) per the NYC Mechanical Code, Section 603.6.
1. Install airtight flexible connections where ductwork or casings connect to fans. Fasten connection securely with bolted clamps. Make the unclamped portion of the connection not less than 6" long, crimped for flexibility.
 2. For fans to 4" w.g. static pressure, 20-ounce chemically impregnated fire-retardant canvas, Vent fabrics, Inc. "Ventfab" or approved equal.
 3. For fans with 4" w.g. static pressure and greater and for all corrosive exhausts, 30 ounce closely woven glass fabric, double-coated with neoprene, Vent fabrics, Inc. "Ventglass" or approved equal.

4. For connections exposed to sun and weather, provide "Ventlon" glass fabric coated with "Hypalon" by Vent fabrics, Inc., or approved equal.
 5. For connections exposed to heat up to 500°F, provide "Ventsil" silicon-coated glass fabric by Vent fabrics, Inc., or approved equal.
 6. For connections for induced draft fans and those exposed to withstanding heat up to 1,000° F, provide two (2) layers of wire-inserted glass cloth and cover with an outer layer of "Vent glass" by Vent fabrics, Inc., or approved equal.
 7. For connections exposed to corrosive agents, acids, alkalis and solvent, provide flexible connections as recommended by Vent fabrics, Inc.
- B. Provide flexible connection to terminal units and outlets.
1. At induction units, mixing boxes and air troffers, provide inlet connections of neoprene-coated and impregnated fiberglass cloth reinforced with continuous galvanized wire helix and preinsulated with 1 1/4" thick fiberglass covered with reinforced aluminum foil, Flexible Tubing Corp. "Thermalflex" Type M-KN (temperature range 0-250°F). Cut back insulation 4" from each end. Seal all insulation ends and joints vaportight.
 2. Use the flexible connections to break direct sheet metal contact and to correct small misalignments. Do not use flexible runouts in place of elbows and/or fittings. Changes in direction shall not be more than 22.5° made with gradual sweep. Limit the flexible connection length to 18" maximum.
 3. Securely fasten the flexible runouts to the ductwork. Slip the flexible connection over a 4" long matching sheet metal sleeve or fitting in the duct prepared with sealing compound. Clamp the flexible runout securely to the duct with a 1" wide, 18 gauge galvanized steel, bolted clamping collar. Reinforce the joint with sheet metal screws and sealing compound.
 4. Where ductwork used with flexible connection is not to be insulated, use equivalent uninsulated flexible connection.

2.17. TURNING VANES

- A. Construct turning vanes of the same material as the ducts in which they are installed.
- B. Construct turning vanes for low and medium pressure systems of 20 gauge galvanized steel or the equivalent thickness for other duct materials as shown in the specification tables.
- C. Turning vanes shall be double vanes as manufactured by Ductmate or approved equal or shop fabricated turning vanes constructed to the same standards. Submit samples of shop-fabricated units for approval.
- D. Reinforce joints to frames for turning vanes for high-pressure system by welding or brazing.
- E. Where indicated on drawings, provide acoustic turning vanes made of perforated 14 gauge aluminum extrusions packed with fiberglass, Airsan "Acoustiturn" as manufactured by Air Filter Corporation or approved equal.

2.18. ACCESS DOORS

- A. Provide access doors in ductwork, equipment housings and connections thereto for access to all apparatus and accessories, air filters, coils, automatic controls, air monitoring and air flow devices, automatic dampers, damper motors, fire dampers, combination fire/smoke dampers and all other areas and equipment requiring periodic inspection or service.
- B. Construct and install access doors of the same materials and to withstand the same test pressure without deformation, vibration or leakage as the ductwork and casings in which they are provided.
- C. Provide doors in insulated casings and insulated ductwork of the double insulated type with a minimum of 18 gauge sheet metal on both sides of a core of 6-pound density mineral fiber rigid insulation. Gasket doors airtight.
- D. Provide access doors in ductwork, which are less than 24" in height and two (2) CAM type latches.
- E. Provide access doors, in casings and ducts 24" in height and over, with four (4) CAM type latches.

2.19. ACCESS PANELS

- A. Furnish access panels to the General Contractor for installation, for access to all concealed valves and to all other concealed parts of the HVAC systems that require accessibility for the proper operation and maintenance of the systems.
- B. All access panels shall be located in closets, storage rooms and/or other non-public areas. Panels shall be positioned so that the equipment can be easily reached and the size opening shall be sufficient for this purpose (minimum 18" x 18"). When access panels are required in corridors, lobby or other occupied areas, they shall be located as directed by the Commissioner.
- C. Access panels shall be prime painted with cylinder lock and two (2) keys as manufactured by Milcor, Karp inc, Acudor or equal. Type shall be as follows:
 - 1. Acoustical tile ceiling - Milcor Type "A", Karp Type "RDWPD", Acudor Type "AP-5010"
 - 2. Gypsum board surfaces - Milcor Type "K", Karp Type "DSC", Acudor Type "DW-5040"
 - 3. Masonry construction - Milcor Type "M", Karp Type "DSC-214", Acudor Type "UF-5000"

2.20. BACKDRAFT DAMPERS

- A. Provide balanced backdraft dampers of the self-operating type where indicated on the drawings. Frames of galvanized steel. Blades 1/8" thick aluminum, pivot rods 1/2" diameter cadmium plated steel. Bearings for pivot rods and tie bars to be of the self-lubricating type. Blades of the bulb type with vinyl stripping on the edge for tight closing. Maximum blade length 44"; for dampers wider than 44", use multiple sections with the frames full height for stability. Blades to have brackets with tie bar of 1 1/4" x 1/4" aluminum. Dampers must shut tight under all operating conditions.

2.21. LOUVERED PENTHOUSES

- A. Provide a louvered penthouse constructed of extruded aluminum on the roof at each location shown on the drawings. Penthouse shall be of the size indicated, and shall be designed to fit the rectangular outside air intake or exhaust opening through the roof curb.
- B. The roof curb will be provided as part of the General Construction unless otherwise noted and will, in general, consist of 4" thick reinforced concrete with wood sill at top. Penthouse base shall be equipped with an aluminum skirt, which shall overlap the sill. The joint between the base and the sill shall be made tight by means of heavy roofing felt or other approved counter flashing material. Penthouse shall be secured to the inside of the wood sill and the curb through the vertical angle stiffeners by means of stainless steel screws. Underside of aluminum skirt shall be coated with black asphaltum paint before installation.
- C. Penthouse shall consist of storm proof louvered sides and solid pitched roof, framed and reinforced, and constructed entirely of aluminum. Penthouses for curbs whose longer side is 4-feet or less (inside dimension) shall be constructed with metered corners heliarc welded and reinforced by 2" x 2" x 1/4" inside corner angles. Larger size penthouses shall be constructed with corner posts 1/8" thick. Frames and blades shall be fabricated of extruded sections, 1/8" in thickness of 6063-T5 aluminum alloy. Blades shall be 4-inches in width and spaced on 4 1/2" (maximum) centers. Louver sections shall be reinforced vertically with 2" x 2" x 1 1/4" angles from the base to the roof, spaced on a maximum of 4-feet centers. A bird screen of not less than No. 16-gauge expanded aluminum or No. 12-gauge, 3/4" mesh aluminum cloth fitted in a frame, shall be secured to the inside of each louver section.
- D. Roof shall be 1/8" 5005-H14 sheet aluminum suitably reinforced on 4-feet (maximum) centers and insulated with membrane undercoating. Submit complete shop drawings for approval.
- E. Louvered penthouse shall be as manufactured by Arrow Louver and Damper Co., or approved equal.

2.22. COMBINATION FIRE/SMOKE DAMPERS

- A. Provide at locations shown on plans or as described in schedules, combination fire/smoke dampers meeting or exceeding the following specifications. Each combination fire/smoke damper shall be 1 1/2 hour fire rated under UL standard 555, and shall further be classified by Underwriters Laboratories as a leakage rated damper for use in smoke control systems under the September 1983 or latest version

- of UL 555, and bear a UL label attesting to same. Damper manufacturer shall have tested, and qualified with UL, a complete range of damper sizes covering all dampers required by this specification; having a single damper size tested and UL qualified is not acceptable. The leakage rating under UL555S shall be no higher than leakage class 1 (4 cfm/sq. ft. at 1" w.g.).
- B. As part of the UL classification, dampers shall have demonstrated a capacity to operate (to open and close) under HVAC system operating conditions, with pressures of at least 4" w.g. in the closed position, and 3,500 fpm air velocity in the open position.
 - C. In addition to the leakage ratings already specified herein, the smoke dampers and their operators shall be qualified under UL555S to an elevated temperature of 250°F or 350°F depending upon the operator. Appropriate electric operators shall be installed by the damper manufacturer at time of damper fabrication OR damper and operator shall be supplied as a single entity, which meets all applicable UL555S qualifications for both dampers and operators.
 - D. Heat Sensor: Each combination fire/smoke damper used in a smoke control system shall be equipped with a UL Classified heat sensor (Ruskin Model TS150). Heat sensor shall function to electrically lock damper in a closed position when duct temperatures exceed 165°F and still allow appropriate authority to override sensor and operate damper as may be required for smoke control functions. The high limit sensor shall prevent the damper from reopening when duct temperature exceeds 350°F. Heat sensor package shall include a damper position indicator switch package (Ruskin Model SP100) linked directly to damper blade to provide capability of remotely monitoring damper position. One switch shall close when damper is fully open; the other switch shall close when damper is fully closed. Heat sensor and switch package shall be capable of interfacing electrically with smoke detectors, building fire alarm systems, building automation systems and remote indicating/control stations.
 - E. Override – Dampers for purging which are controlled from a central fire command station shall be provided with a 165°F heat sensor with normally closed contacts to close damper or a RESETTABLE BIMETALLIC link which opens on temperature reaching 165°F permitting damper to close and lock it open.
 - F. Where dampers are used in a combination grille and shaft wall arrangement, provide either a grille access damper similar to Ruskin FSD60GA or front access damper similar to Ruskin FSD60FA. Dampers shall include factory installed ¼" fiberfrax insulation on all four sides of the damper and sleeve assembly.
 - G. Dampers shall be manufactured by Ruskin or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION OF DUCTWORK

- A. Adhere to drawings as closely as possible. The right is reserved to vary the runs and sizes of ductwork and to make offsets, where necessary to accommodate conditions arising at the building. Coordinate duct installation with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- B. Provide all ductwork built with approved joints and seams smooth on the inside and a neat finish on the outside. Duct joints as near airtight as possible with laps made in the direction of airflow and no flanges projecting into the air stream. Provide ducts adequately braced to prevent vibration; additional bracing shall be provided where necessary.
- C. Ducts shall be securely fastened to the building construction. Provide all hanger inserts as required. Inserts shall be approved for use. Contractor shall furnish and install supplementary steel as required to support ductwork. Strap or trapeze hangers may be attached to building steel using approved bolted beam clamps. Where ductwork is covered in vermiculite plaster, wire lath or lead wrapping, provided additional duct hangers and inserts as required.
- D. All ducts passing through floors shall have an angle iron flange around the floor at the duct opening to act as a dirt seal and duct support. Openings between floor and duct shall be sealed airtight. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening

and duct or duct-plus-insulation with sheet metal flanges of same gauge as duct. Overlap opening on four sides by at least 1 1/2".

- E. Do not run ductwork through electrical equipment spaces, above electrical panels, transformer vaults or enclosures.
- F. Provide No. 18 gauge galvanized iron safing around all ducts which, penetrate floor slabs, completely closing off shafts terminating at mechanical room walls, floors and ceiling slabs.
- G. Seal all joints airtight with 3M Co. Type EC-800, Carlisle Iron-Grip 601, Benjamin Foster 32-17 or approved equal. Where the duct is pierced for any reason, seal with 3M Co. Type EC-800, Carlisle Iron-Grip 601, Benjamin Foster 32-17 or approved equal.
- H. Adequate space shall be provided around all ductwork to permit installation of insulation when specified.
- I. Whenever it is necessary to penetrate the ductwork, with piping or structures, the Contractor shall receive permission from the COMMISSIONER. Streamliner fittings, as detailed in the SMACNA Manuals shall be adhered to.
- J. Except as otherwise indicated, all angle irons required for any ductwork construction and supporting shall be galvanized.
 - 1. For aluminum ductwork, provide aluminum support except where materials are electrolytically separated from ductwork.
 - 2. For kitchen exhaust ductwork, provide 10 gauge (or 16 gauge outside N.Y.C.) Carbon steel supports.
- K. Exact dimensions of register boxes must await approval of grilles, and exact locations shall be submitted for approval; otherwise, any changes directed after installation shall be made without additional cost. All register boxes and other openings of the ductwork must be tightly closed during construction to keep out rubbish.
- L. Care shall be taken to prevent metal scraps and debris from entering the ductwork. All foreign material shall be removed from the duct prior to installation and after installation. During construction, all open ends of ductwork shall be covered with canvas.
- M. Do not suspend any device or work items installed by any trade from ductwork (for example - lighting conduit, lighting fixtures, piping, ceiling construction, etc.).
- N. For exhaust or return ductwork in which condensation can occur including kitchen, dishwasher, pool, shower, and fume hood ductwork, pitch ductwork back to outlets.
- O. Where duct risers are indicated to be offset from shaft to shaft, wrap the entire horizontal offset in a 2-hour fire resistant duct wrap (see Section 23 07 00).
- P. Where duct penetrate mechanical room floor slabs, provide a 4" concrete curb around duct penetration.
- Q. Duct Leakage Tests
 - 1. Upon completion of the duct systems, and prior to installation of any duct covering, Contractor shall test ductwork indicated below and related components for air leakage in accordance with the SMACNA HVAC Air Duct Leakage Test Manual. The rate of air leakage (CL) shall be less than or equal to 6.0 cfm per 100 square feet of duct surface area using the formula as follows:
$$CL = F(\text{measured rate leakage rate} \times P(\text{static pressure of test})^{0.65})$$
 - 2. All joints and seams are to have been sealed prior to testing, per SMACNA recommendations and with duct sealant as specified herein. If upon completion of Air Balancing and Testing, it is shown that leakage exists, Contractor shall be responsible to identify leakage areas, reseal ductwork, and retest ductwork as required.
 - 3. The ductwork sections to be tested include:
 - 4. Tail Pipe Exhaust system
 - 5. Contractor shall temporarily seal all required duct sections, provide all required test apparatus, and provide all personnel and materials as required to conduct tests.

6. Results of duck leakage tested shall be submitted to COMMISSIONER for review and made available for inspection by the local code official *if* required. At least 25% of the duct area shall have been tested and all tested sections must meet the requirements of this specification.

END OF SECTION

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SECTION 23 3117 - ACOUSTICAL TREATMENT

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum and [5] the Contract (City of New York Standard Construction Contract).
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Acoustical Treatment work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Sound linings.

1.03 RELATED WORK

- A. Sheet metal ductwork.
- B. HVAC equipment.
- C. Diffuser, grilles and registers.

1.04 QUALITY ASSURANCE

- A. Applicable Standards:
 - 1. ASHRAE Standard 36-72, NFPA 90-A.
 - 2. All insulation, and adhesives including fittings and butt strips, shall have non-combustible fire and smoke hazard system rating and label as tested by ASTM E-84, NFPA 255 and UL 723 not exceeding Flame Spread 25, Smoke Developed 50.
 - 3. UL 18 ASTM C 1071 ASTM G21 and G22.
 - 4. Accessories such as adhesives, mastics, cements, tapes and cloth for fittings shall have the same ratings as listed above.
 - 5. All products or their shipping cartons shall bear the Underwriters' label indicating that flame and smoke ratings do not exceed the above criteria.
- B. Acoustical Performance Warranty: Guarantee that all equipment will comply with applicable noise level limits specified, when tested in accordance with standards. Provide compliance with applicable noise limits. For equipment operation at pressures, flows, etc., as per plans and specifications.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's data sheets.
- B. Instructions: Erection and installation instructions.
- C. Test Reports: Factory performance data anti-microbial agent tests and field tests.
- D. Certification: Submit certified test data for sound power produced by fans, grilles, registers, diffusers. Measurements in accordance with above standards.

1.06 DELIVERY, STORAGE & HANDLING

- A. Deliver materials protected and undamaged with cartons labeled as to manufacturer and contents.
- B. Store materials in locations and in a manner to protect same from damage of any kind.
- C. Acoustic material and acoustic material installed within ductwork, sound attenuators, air handling equipment, etc. can absorb damaging moisture and become soiled when shipped and if left outdoors prior to being installed. Absorbed moisture can foster biological growth and can lead to indoor air quality problems at a later date. To minimize damage all such material or equipment shall be shrink-wrapped prior to shipment from the factory. The shrink-wrap shall only be removed once the materials and equipment have been move into enclosed spaces within the building.

PART 2.00 - PRODUCTS

2.01 ACOUSTICAL PERFORMANCE REQUIREMENTS

- A. Noise levels of air conditioning and/or ventilating equipment ducts, units, grilles, registers and diffusers to conform to the following NC curves per ASHRAE.

All spaces other than Mechanical RoomsNC-35

2.02 LOW VELOCITY DUCT AND PLENUM LINING (Fiber Glass)

- A. Sound-Absorbing Material (Ductwork): Fiberglass, 1½" minimum thickness, 1½ lb./cu.ft.density with minimum NRC-0.70, suitable for velocity of 4,000 FPM. 2" liner shall have 1½ lb. cu. ft. density with minimum NRC-1.00. Provide metal nosing at supply fan discharge, all transverse joints, turning vanes, dampers, access doors and at end of lining.
- B. Liner shall be provided with factory-applied edge coating.
- C. Liner shall be provided with a tightly bonded mat facing for a smooth airstream and to resist damage, dust or dirt.
- D. All acoustical lining shall be treated with anti-microbial agent to inhibit microbial growth in accordance with UL18, ASTM C1071 and ASTM G21 and G22.
- E. Liner shall meet all requirements of NFPA 90A.
- F. Sound-Absorbing Material (Plenums):
Fiberglass, 2" minimum thickness, 3 lb./cu. ft. density with minimum NRC-1.05.
- G. Adhesive: Benjamin Foster 85-20, or approved equal. Adhesive shall conform to ASTM C916.
- H. Schedule: Acoustical line the following unless otherwise noted:
 - 1. Line ductwork with 1 1/2" liner where indicated on drawings.
- I. Where acoustic lining is specified, thermal insulation may be deleted if the acoustic lining meets the minimum R-value requirements of the New York City Energy Conservation Construction Code (NYCECCC) and ASHRAE. If the thickness specified for acoustic performance does not meet the thermal performance, increase the thickness of the acoustic lining accordingly or provide additional external thermal insulation.
- J. Liner shall be manufactured by, Owens Corning Aeromat, Johns Manville, Knauf, Certainteed or approved equal.
- K. Where round ductwork is indicated with acoustic lining, provide double wall insulated duct as specified under Section 23 31 13.

PART 3.00 - EXECUTION

3.01 INSTALLATION

- A. Dimensions of lined ducts indicated are the inside dimensions of the duct after the liner has been installed.
- B. Adhere liner with 100% coverage of adhesive.
- C. Mechanical fasteners which do not pierce the sheet metal:
 - 1. On 16" centers on top sections when widths exceed 12".
 - 2. On sides when heights exceed 24".
 - 3. Weld pins and 2" diameter washers: Edges coated with sealant.
- D. Abutting edges of acoustic linings, folded under and stapled to ensure that raw edges are sealed.
- E. Install exposed edges of acoustic linings provided with sheet metal nosing.

3.02 SOUNDPROOFING CONSTRUCTION

- A. Required for penetrations of ductwork, pipes and conduits through walls, floors and ceilings of mechanical rooms and Sound-Critical Spaces (Theaters, rehearsal space, control rooms), as well as those walls, floors and ceilings indicated on the drawings.
- B. The Contractor shall ensure that the sound control performance of structures be maintained in accordance with the drawings and specifications. All penetrations shall be installed in a manner that results in complete air tightness through structure. If a condition occurs where penetration of the structure by a duct, pipe, conduit, etc., is not shown clearly on the drawings (or described in the specifications), the Contractor shall ask immediately for clarification of the method necessary to install the particular item.
- C. Penetrations of Single-Wythe Masonry and Concrete Constructions
 - 1. Ductwork:
 - a. Install a metal sleeve at the penetration. Size the sleeve to allow for 1" thick sheet insulation and normal duct clearances. Line the sleeve with 1" thick elastomeric closed cell neoprene sheet insulation (AP Armaflex Sheet and Roll Insulation from Armstrong, or approved equal).
 - b. Install duct through lined sleeve and seal airtight with acoustical sealant or fire-rated acoustical sealant (3M Corporation CP 25 or equal) if partition is fire-rated.
 - c. Do not rigidly secure duct to wall with angles.
 - 2. Pipe/Conduit diameter = 1" or larger:
 - a. Install metal sleeve at the penetration. Size the sleeve to allow for 1/2" thick pipe insulation and normal pipe clearances. Line the sleeve with 1/2" thick elastomeric closed cell neoprene pipe insulation (AP Armaflex SS Self-Seal Pipe Insulation from Armstrong, or approved equal).
 - b. Install pipe/conduit through lined sleeve and seal airtight with acoustical sealant or fire-rated acoustical sealant (3M Corporation CP 25 or equal) if partition is fire-rated.
 - c. Do not rigidly secure pipe/conduit to wall with angles.
 - 3. Pipe/Conduit diameter = 1" or less:
 - a. Wrap pipe/conduit with 1/2" thick elastomeric closed cell neoprene pipe insulation (AP Armaflex SS Self-Seal Pipe Insulation from Armstrong, or approved equal). Extend wrapping a minimum of 2" beyond the width of the partition on either side.
 - b. Grout tightly to the neoprene pipe insulation on the pipe/conduit.
 - c. Trim neoprene pipe insulation to the width of the partition, and seal airtight with acoustical sealant or fire-rated acoustical sealant (3M Corporation CP 25 or equal) if partition is fire-rated.

- D. Penetrations of Single Stud Drywall Constructions
1. Ductwork:
 - a. Wrap duct with 1" thick elastomeric closed cell neoprene sheet insulation [AP Armaflex Sheet Insulation by Armstrong, or approved equal]. Extend sheet insulation a minimum of 2" beyond the width of the partition on either side.
 - b. Install drywall tight to the sheet insulation.
 - c. Trim sheet insulation to the width of the partition, and seal airtight with acoustical sealant or fire-rated acoustical sealant (3M Corporation CP 25 or equal) if partition is fire-rated.
 2. Pipe/Conduit diameter equal to 1" or larger:
 - a. Wrap with 1/2" thick elastomeric closed cell neoprene pipe insulation [AP Armaflex SS Self-Seal Pipe Insulation by Armstrong, or approved equal]. Extend wrapping a minimum of 2" beyond the width of the partition on either side.
 - b. Install a metal pipe sleeve around and spackle tightly to a full thickness of partition.
 - c. Install the drywall around the sleeve and spackle tightly to full thickness of partition.
 - d. Trim pipe insulation and sleeve to the width of the partition, and seal airtight with acoustical sealant or fire-rated acoustical sealant (3M Corporation CP 25 or equal) if partition is fire-rated.
 3. Pipe/Conduit diameter less than 1".
 - a. Wrap with 1/2" thick closed cell neoprene pipe insulation [AP Armaflex SS Self-Seal Pipe Insulation by Armstrong, or approved equal]. Extend wrapping a minimum of 2" beyond the width of the partition on either side.
 - b. Install the drywall tight to the neoprene pipe wrap.
 - c. Trim neoprene insulation to the width of the partition, and seal airtight with acoustical sealant or fire-rated acoustical sealant (3M Corporation CP 25 or equal) if partition is fire-rated.
- E. Multiple Duct/Pipe/Conduit Penetrations
1. Where a series of duct, conduits or pipes are penetrating the wall/floor/ceiling, each duct/conduit/pipes shall be separated by minimum 4" in all directions.
 2. Multiple duct/pipes/conduit penetrations at one location (i.e. one large opening for a series of pipe runs) is not recommended.
- F. Penetrations of Double-Wythe Masonry/Concrete and/or Double Stud Drywall and/or Combination Constructions
1. Use same techniques described above EXCEPT do not bridge the two studs or wythes with solid members such as sleeves or stud frames. Each sleeve or frame must be completely separate for each individual wythe or stud.

3.03 PERFORMANCE VERIFICATION

- A. Subsequent to equipment installation, the installation will be surveyed visually for conformance to specified installation, materials and workmanship by the Commissioner. This review will take place following receipt of an air-balancing report, and prior to final acceptance of the installation. All parts of the installation will be reviewed for conformance to this specification including vibration isolation devices, duct connections (and leaks thereof), and sealing of all penetrations. The background sound levels due to equipment noise may be measured in occupied spaces by the Commissioner where noise is considered objectionable.
- B. If the results of the visual survey indicate non-conformance with the specifications or if the results of any acoustical measurements indicate non-conformance with the specified PNC levels, due to improper installation, poor workmanship or unapproved substitutions or shop drawings, it shall be the responsibility of the contractor to correct, at his own expense, such deficiencies by methods that shall be approved by the COMMISSIONER prior to incorporation.

- C. After corrections have been made, further acoustical tests shall be performed at contractor's expense for verification of conformance to specified PNC levels.

END OF SECTION

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SECTION 23 3500 - SPECIAL EXHAUST

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Provide where shown on the drawings all exhaust hoods, ductwork, fans, exhaust stacks and louvers, etc. to capture and exhaust the air contaminants generated within the various studios and spaces of the sizes and capacities indicated.
- B. Provide exhaust systems as specified herein. All exhaust system components are designated as Class 2.
- C. In order for air to be efficiently exhausted from an area, an equal amount of air must be made up (supplied) to the area. See drawings.

1.03 RELATED WORK

- A. Sheet metal ductwork.

1.04 SUBMITTALS

- A. Make submittals on all items listed above in Section 1.2, Work Included.
- B. Shop drawings indicating size, location, details and installation requirements. Shop drawings 3 D CAD with 3/8" scale hard copies, showing ductwork layout indicating size, shop construction details, gauges and installation requirements. Shop drawings shall conform to the requirements of Section 233113 Ductwork.
- C. Product Data: Manufacturers' printed data, catalog cuts, test data, performance curves, manufacturer's recommendations.
- D. Coordination Drawings: Plans, elevations, 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 supports.
 - 2. Duct, piping and wiring roughing-in requirements (determine spaces reserved for electrical equipment).
 - 3. Access requirements for service and maintenance.

- E. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring for HVAC equipments. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed. Operational and Maintenance Manuals: Manufacturer's instructions for operation and maintenance.
- F. Field quality-control test reports.
- G. Warranties: Special warranties specified in this Section.
- H. Test Reports: Field testing of air outlet flow.
- I. Instructions: Erection and installation instructions.

1.05 STANDARDS, CODES AND REGULATIONS

- A. The following codes, regulations, standards and guidelines are applicable:
 - ACGIH American Congress of Governmental Industrial Hygienist
 - ASHRAE American Society of Heating, Refrigerating and Air Engineering
 - ANSI American National Standards Institute
 - ASTM American Society for Testing Materials
 - NBFU National Board of Fire Underwriters
 - NEMA National Electrical Manufacturers Association
 - SMACNA Sheet Metal and Air Conditioning Contractors National Association
 - CS U.S. Commercial Standards
 - AWS American Welding Society
 - OSHA Occupational Safety and Health Administration
 - EPA Environmental Protection Agency
 - 2014 NYC Energy Conservation Code

PART 2.00 - PRODUCTS

2.01 DUCTWORK AND HOODS

- A. The point source ventilation systems (slot hoods and flexible type) are to be fabricated using galvanized steel. All sheet metal ductwork is to be fabricated from 20 gauge, round galvanized steel or heavier. No other materials may be used without prior approval. The fabrication and installation are to be in accordance with the procedures outlined in the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Manual of Round Industrial Duct Construction Standards and the ACGIH (American Conference of Governmental Industrial Hygienists).
- B. The slot hoods are to be constructed of 16 gauge, galvanized steel sheet. The hoods are to be free of sharp edges and burrs. Each hood is to have a 1" angle iron welded to the inside

face of the slots to minimize vibration and noise. The hood slots are to have rolled edges to prevent whistling that is often caused by high velocity air passing over a sharp edge. The hoods have been designed in accordance with Industrial Ventilation, A Manual of Recommended Ventilation Practice, published by the American Conference of Governmental Industrial Hygienists (ACGIH). Any deviations must be approved by GAQCI before fabrication. Prefabricated hoods of appropriate dimensions are acceptable.

- C. All duct and hood seams are to be sealed leak tight. Any method of sealing the exhaust system (other than duct tape as the primary sealing mechanism) is acceptable (i.e., soldering welding, epoxy, etc.) as long as it is solvent resistant.
- D. All ductwork, hoods, plenums, etc. must be finished with smooth interior surfaces.
- E. In the event there are conflicts between the specifications and standards, the standards will govern unless the specifications are in excess of the standards.
- F. Exhaust systems are considered to be Medium Duty, Class II according to Industrial Ventilation, a manual published by the ACGIH.
- G. Elbows and bends are to be a minimum of two gauges heavier than straight lengths of equal diameter and have a centerline radius of at least 2.0 and preferably 2.5 times the duct diameter. See details.
- H. Elbows of 90 degrees are to have at least five (5) sections pieced proportionately for ductwork with less than 6" diameter and seven (7) sections for larger diameters. Bends of less than 90 degrees are to be of a proportional number of sections. Prefabricated elbows of smooth construction may be used and are preferred..
- I. Branches & tees are to enter the main at the large end of tapered transition pieces at an angle not to exceed 45° with 30° preferred. All transition pieces are to have a taper of 5 inches in length for each 1 inch change in diameter. Connections are to be made with no two branches entering at opposite sides. See details.
- J. Transitions in mains and sub-mains are to be tapered. The taper should be at least 5 units long for each 1 unit change in diameter. See details.
- K. Ductwork is to be supported at intervals not exceeding 8 feet on center. Duct supports must be of sufficient capacity to carry the weight of the system if half filled with water and to place no load on the connecting equipment. Refer to the SMACNA standards. Ductwork is to be supported independently of hoods.
- L. Ductwork is to have drain valves or plugs installed on the low end of the horizontal ductwork and at the bottom of all vertical duct risers.
- M. Horizontal ductwork is to be pitched towards the exhaust fan (in the direction of flow) at 1" every 10' of length.
- N. The exhaust system is to be constructed with materials suitable for the conditions of service and installed in a permanent and workmanlike manner. Interior of all ducts are to be smooth and free from obstructions, especially at joints.
- O. Rectangular ducts shall NOT to be used anywhere in any of the exhaust systems.
- P. A fully closing damper is to be installed in each hood riser to enable accurate balancing of each exhaust point and to enable each exhaust hood to be fully closed.
- Q. Cleanouts are to be provided at each end of a horizontal run of duct especially in the ducts carrying particulates..

2.02 EXHAUST BLOWERS

- A. The Woodworking tool exhausts are all Class 2.

- B. The fan blades are to be spark free.
- C. Use a totally enclosed, drip free, motor. The motor does not have to be explosion proof.

2.03 DUST COLLECTORS

A. Wood Dust Collector

1. DISCHARGE HOPPER

Hopper is 12 gauge steel, square on the top and octagonal on the bottom. Collector has two hoppers. Bottom discharge is a 14" octagonal opening with a bridge free design and no internal ledges. Each discharge hopper attaches to 55-gallon drum with gate and latches. Contractor to provide 55 gallon drum

2. SUPPORT LEG STRUCTURE

Legs provide 48" clearance below the hopper discharge flange and are designed for seismic zone 4, 100 mph wind load, and 30 lbs per square foot roof load.

3. DUST LADEN AIR INLET

A high inlet creates a general downward airflow pattern in the filter section to optimize filter performance. Front inlets are standard on each module. Each filter column is protected from direct dust impingement by an internal baffle plate.

4. CARTRIDGE FILTERS (for wood dust)

The media in each filter cartridge incorporates a durable outer layer of nanofibers that intercepts even the smallest particles at the surface of the media. Independent Cartridges have a Minimum Efficiency Reporting Value (MERV) of 13 based on the ASHRAE 52.2-1999 test standard. Ultra-Web cartridges also achieve start up efficiencies of 99.9% on 0.2-2 micron dust particles, earning a rating of "M" as determined by the BIA European Institute for Occupational Safety.

Flame retardant media, which reduces the potential for fire damage to the cartridges. This resin system shall prevents the media from supporting combustion once an ignition source such as a spark extinguishes

The filter shall be manufactured by Donaldson Torit, United Air Specialists, Camfil or approved equal cartridge features an open design without outer liner to improve pulse-cleaning effectiveness on very fine and agglomerative dusts. Each cartridge contains 190 square feet of media.

5. FILTER CLEANING

Cartridges are automatically cleaned by periodic pulses of compressed air flowing in the opposite direction of normal airflow. The cleaning system provides a uniform pulse for maximum cleaning effectiveness.

6. CLEANING CONTROLS

The proprietary solid-state Control Board, featuring a digital display, controls the filter cleaning by measuring and controlling between high and low pressure set points. It provides filter restriction and cleaning control, starting and stopping the cleaning process at user selected set points. No battery backup required. The Delta P controller will be integrated into the door of the control panel.

7. FILTER ACCESS

Filter cartridges are accessed from outside the collector through oval access ports on the front of the unit. Each port provides access to two filter cartridges. No tools are required for filter removal/installation. Filters are angled 15 degrees for easier servicing.

8. REQUIRED SERVICES

The collector requires 10 scfm of 90 to 100 psig, clean, dry compressed air based on a 10 second pulse interval. Timer requires 110 VAC circuit.

9. EXPLOSION RELIEF VENTS

Provide (1) 34" x 46" explosion relief vent is located on the side of the unit. Explosion vents limit overpressure in the event of a deflagration in order to maintain the structural integrity of the collector.

10. ELECTRICAL CONTROL PANEL

Includes motor starter, circuit protection for each motor, a transformer, pulse cleaning controls, a Torit Delta P, Dwyer DCT1000DC, Camfil FDC or approved equal control mounted in the panel door, start/stop buttons, and a flange mounted disconnect switch. All components are IEC rated; the enclosure is rated NEMA 12 with 480 primary voltage.

11. EXHAUST FAN

The wood dust collector shall be provided with a factory provided field mounted direct drive fan as scheduled.

2.04 AIR FLOW SWITCHES

- A. Install an Electronic Flow Switch in each duct system, downstream of all of the risers, but upstream of the fan. The switch must have a 3 second response time or less.
- B. The switches shall be electronically connected to a red/green light at each station to indicate whether air is flowing through the duct at an appropriate flow rate.

2.05 ELECTRICAL

- A. All equipment with electrical components is to bear the UL label. The contractor is responsible for all electrical design and installation.

2.06 EXHAUST AIR FLOW RATES

- A. See Drawing M-113 for exhaust flow rate requirements.

PART 3.00 - EXECUTION

3.01 EXAMINATION

- A. Examine areas where exhaust devices and systems 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.

3.02 INSTALLATION

- A. Install hoods and ductwork plumb in accordance with approved detail installation drawings and manufacturer's recommendations.
- B. Provide duct supports of sufficient capacity to carry the weight of the system if half filled with material and to place no load on the connecting equipment. See SMACNA standards [Ref. 138 and 139].
- C. Fire dampers are to be installed in accordance with the local and National Fire Protection Association Codes and other applicable codes and standards.
- D. All flow rates shall be adjusted to the design flow rate by a qualified duct balancer. Provide a means of locking flow adjustment dampers after the adjustments have been made.
- E. Where federal, state or local laws conflict with the preceding, the more stringent requirement should be followed. Deviation from existing regulations require approval of the COMMISSIONER.

3.03 CONTRACTOR'S RESPONSIBILITIES

- A. The contractor shall give the proper authorities all requisite notices or information relating to the work under this section.
- B. The contractor shall obtain and pay for all fees, licenses, permits and certificates, comply with the rules and regulations of all local, state and federal authorities having jurisdiction, the rules and regulations of the National Board of Fire Underwriters and the Public Utilities Companies servicing the building.
- C. The Contractor shall be responsible for the care and protection of all work included under this section. Protect all equipment, materials and furniture from damage and theft. All materials and equipment damaged or stolen is to be repaired or replaced. Protect all equipment, outlets and openings with temporary plugs, caps and covers.
- D. Manufacturers shall provide their standard replacement warranties for material and equipment furnished under this section. Such warranties are to be in addition to and not in lieu of all liabilities, which the manufacturer and contractor may have by law or by provisions of the contract documents. All materials, equipment and work furnished under this section are to be guaranteed against all defects in materials and workmanship for a minimum period of one (1) year commencing with the date of substantial completion. Any failure due to defective material, equipment or workmanship is to be corrected at no expense to the City of New York.
- E. An air balancing report detailing the flow rates, static pressures and temperatures at each location shall be submitted by the contractor prior to the City of New York accepting the system. All flow rates shall be adjusted to the design flow rate by a qualified balancer. Provide a means of locking flow adjustment dampers after the adjustments have been made.

END OF SECTION

SECTION 23 3713 - DIFFUSERS, REGISTERS AND GRILLES

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Provide where shown on the drawings all metal diffusers, grilles and registers of the sizes and capacities indicated.

1.03 RELATED WORK

- A. Sheet metal ductwork.

1.04 SUBMITTALS

- A. Shop Drawing: Shop retail drawings indicating location and anchoring methods.
- B. Product Data:
 - 1. Manufacturer's printed data, catalog cuts and schedule.
 - 2. Submit engineering data in a manner to facilitate convenient review of the following factors.
 - 3. Aspiration ability, including temperature and velocity transverse, throw and drop of each unit, noise criteria ratings for each unit, sizes, free area and quality of construction.
- C. Samples, when requested.
- D. Instructions: Erection and installation instructions.

PART 2.00 - PRODUCTS

2.01 BASIS OF DESIGN

- A. Select ceiling diffusers and top registers to diffuse the air uniformly throughout the occupied space, and to comply with noise criteria specified under acoustical treatment section. The air shall be diffused at the 5' level to a velocity of not greater than 50 fpm and a temperature differential of not greater than 2°F, when compared with mean room temperature.
- B. Provide all ceiling diffusers with an equalizing deflector and opposed blade volume damper.
- C. Provide air return ceiling outlets with opposed blade dampers.
- D. All diffusers, grilles and registers, unless otherwise noted, shall be factory coated with baked enamel finish of color to be selected by Commissioner. All grilles and registers shall be furnished with a 1/4" sponge rubber gasket around the grille frame.

- E. Exceptions to foregoing types of grilles, registers and diffusers shall be as indicated on the drawings.
- F. In all cases, a schedule of grilles, diffusers and registers shall be prepared and submitted to the COMMISSIONER for approval of size and design of outlets before they are ordered for installation.
- G. Each air supply outlet shall have the required capacity and shall be guaranteed to give the required draft with draftless diffusion.
- H. Install all air outlets, supply, return and exhaust, in the exact locations indicated on the architectural reflected ceiling plans.
- I. All air outlets shall be provided with border frames to match ceiling, soffit or wall construction, and as approved by the COMMISSIONER.
- J. All air distribution equipment shall be as manufactured by Price, Anemostat Titus or approved equal.

2.02 SCHEDULE

- A. Ceiling diffusers (CD) shall be Anemostat Model DF, Price Model SCD, Titus Model TDC or approved equal.
- B. Ceiling return grilles (CG) shall be Anemostat Model S3HD, Price Model 510, Titus Model 301 or approved equal.
- C. Ceiling exhaust registers (CR) shall be Anemostat Model S3HD with Model OB-1 opposed blade damper, Price Model 510 with opposed blade damper, Titus Model 301 with opposed blade damper or approved equal.
- D. Linear sidewall diffusers shall be Anemostat Model AL-250 with frame and border type 7, Price Model SDS with border type 6, Titus model FL-25 with border type 22 or approved equal with, concealed mounting. Provide cable operated dampers, Model OBASL or approved equal, with a minimum 3 feet of cable. See floor plans for actual cable lengths.
- E. Top supply registers (TR) shall be Anemostat Model S2V with Model OB-1 or approved equal opposed blade damper.
- F. Top return grilles (TG) shall be Anemostat Model S3HD, Price Model 510, Titus Model 301 or approved equal.
- G. Top return registers (TR) shall be Anemostat S3HD with Model OB-1 opposed blade damper, Price Model 510 with opposed blade damper, Titus Model 301 with opposed blade damper or approved equal.

2.03 ACOUSTICAL PERFORMANCE REQUIREMENTS

- A. Noise levels of air conditioning and/or ventilating equipment ducts, units, grilles, registers and diffusers to conform to the following NC curves per ASHRAE:

Office space.....NC-35

- B. Grilles, Registers and Diffusers: Maximum permissible sound power levels in octave bands where operated in an installed condition per plans and specifications:

Octave Band	Maximum PWL re: 10-12 watts (NC-35)
1	64
2	56
3	49
4	46
5	43
6	42
7	41
8	42

PART 3.00 - EXECUTION

3.01 INSTALLATION

- A. Install grilles, registers and diffusers in accordance with approved detail installation drawings and manufacturer's recommendations.
- B. Install and locate per Architectural Drawings.

END OF SECTION

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SECTION 233813 - KITCHEN-RANGEHOOD

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, disassembly, re-assembly, and services necessary to furnish and install the Commercial Kitchen Range Hood.

1.03 RELATED WORK

- A. 23 0500 COMMON WORK RESULTS FOR HVAC
- B. 23 0513 COMMON MOTOR REQUIREMENTS FOR HVAC
- C. 23 0593 TESTING, ADJUSTING & BALANCING FOR HVAC
- D. 23 0700 HVAC INSULATION
- E. 23 0900 INSTRUMENTATION & CONTROL FOR HVAC
- F. 23 3113 METAL DUCTS
- G. 23 3117 ACOUSTICAL TREATMENT
- H. 23 6450 HVAC EQUIPMENT

1.04 QUALITY ASSURANCE

- A. Units to comply with the requirements of the 2014 NYC Building Code [Chapter 9 section 904], 2014 NYC Fire Code [Chapter 9 section 903], N FPA 96, National Electric Code, NYC Fire Prevention and 2014 NYC Building Code.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, required clearances, weights, furnished specialties and accessories; and installation and start-up instructions.
- B. Shop Drawings: Submit shop drawings detailing the manufacturer's electrical requirements for power supply wiring for exhaust fan and make-up air unit. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- C. Operation and Maintenance Data: Submit maintenance data and parts list for each rooftop unit, including "trouble-shooting" maintenance guide, servicing guide and preventative maintenance schedule and procedures. Include this data in maintenance manual.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Unit shall be stored and handled according to the manufacturer's recommendation.

1.07 SCHEDULING AND SEQUENCING

- A. The Kitchen exhaust hood and fire suppression system shall be installed as a turn-key installation by the unit manufacturer. Included in this work will be all NYC Building Department filing, permits and sign-off.
- B. Coordinate installation of units with the installation of the structural supports, ductwork, exhaust fan, make up air unit, systems controls and fire alarm system.

1.08 WARRANTY

- A. The manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at the manufacturer's option when returned to the factory, transportation prepaid.

PART 2 PRODUCTS

2.01 CANOPY HOOD

- A. The unit is a compensating wall canopy ventilator rated for all types of cooking equipment. Shall be capable of providing up to 80% make-up air through a front perforated stainless steel plenum. Supply rises shall have volume dampers for the purpose of adjusting the air flow. Hoods designated as Internal Compensating or Front Face horizontal discharge shall NOT be used. The hood shall have size, shape and performance specified on drawings.
- B. Construction shall be type 430 stainless steel with a #3 or #4 polish where exposed. Individual component construction shall be consistent with ETL and NSF standards. Construction shall be dependent on the structural application to minimize distortion and other defects. All seams, joints and penetrations of the hood enclosure to its lower outermost perimeter that directs and captures grease-laden vapor and exhaust gases shall have a liquid-tight continuous external weld in accordance with NFPA 96. Hood interior shall be fully welded. Neither caulk nor paint will be allowed in interior of hood. Hood shall be wall type with a minimum of four connections for hanger rods. Connectors shall have 9/16" holes pre-punched in 1/2" x 1" W angle iron at the factory to allow for hanger rod connection by others.
- C. End panels to be provided in order to aid capture and containment of grease particles. Cooking equipment to be placed as close to back wall as possible. If gap exists between cooking equipment and back wall, install a stainless steel panel across the back of the cooking equipment to the wall.
- D. The hood manufacturer shall supply complete computer generated submittal drawings including hood sections view(s) and hood plan view(s). These drawings must be available to the Commissioner for their use in construction, operation and maintenance.
- E. If char-broiler cooking equipment is included under the hood, hood shall be designed with a front overhang 18" past the cooking surface of the char-broiler. Where there is no char-broiler, hood shall be designed with a front overhang of 12" past the cooking surface of the range or fryer, whichever is furthest from the back wall. In either situation, the hood shall be designed with a side overhang of 6" past the left and right cooking equipment boundary.

- F. Exhaust duct collar to be 4" high with 1" flange. Duct sizes, CFM and static pressure requirements shall be as shown on drawings. Static pressure requirements shall be precise and accurate; air velocity and volume information shall be accurate within 1-ft increments along the length of the ventilator.
- G. U.L. compact fluorescent light fixtures and globes shall be installed and pre-wired to a junction box. The light fixtures shall be installed with a maximum of 4'-0" spacing on center and allow up to the equivalent of a 100 watt standard incandescent light bulb. Wiring shall conform to requirements of New York City and National Electric Codes. Electrical supply to exhaust hood shall be on a dedicated circuit.
- H. Provide one interconnected common switch for exhaust fan and supply. Provide one switch for lights underneath hood. Label each switch.
- I. The hood shall have:
 - 1. A double wall insulated front to eliminate condensation and increase rigidity. The insulation shall have a flexural modulus of 475 EI, meet UL 181 requirements and be in accordance with NFPA 90A and 90B.
 - 2. An integral front baffle to direct grease laden vapors toward the exhaust filter bank.
 - 3. A built-in wiring chase provided for outlets and electrical controls on the hood face and shall not penetrate the capture area or require an external chase-way.
 - 4. The grease drain system shall be an integral part of the hood back and have a minimum 1/8" per foot slope with an exposed, removable Y2 pint grease cup to facilitate cleaning.
- J. The front plenum shall provide make-up air through perforated stainless steel panels.
- K. All seams shall be welded and have stainless steel on exposed surfaces. Unexposed surfaces shall be constructed of aluminized steel. Perforated diffuser plates shall be included in the design, to provide even air distribution and the plenum shall be insulated to prevent condensation.
- L. The hood shall be ETL Listed as "Exhaust Hood Without Exhaust Damper", NSF Listed and built in accordance with NFPA 96. The hood shall be listed for 450° F cooking surfaces at 150 CFM/ft, 600° F cooking surfaces at 200 CFM/ft, and 700° F cooking surfaces at 250 CFM/ft. Hood shall be ETL Listed as "Exhaust Hood Without Exhaust Damper".
- M. After installation of kitchen exhaust system, a test and balance is to be performed by the mechanical contractor responsible for the installation to assure proper exhaust and supply air requirements have been met. A distributor certification is to be submitted by the mechanical contractor assuring this work is complete.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which system is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Commissioner.

3.02 INSTALLATION

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

COMMERCIAL-KITCHEN HOODS
23 3813 - 3

- A. The entire kitchen range hood and make-up air system including hood, make-up air and exhaust ductwork, insulation, make-up air unit, exhaust fan, fire protection system, controls, etc. shall be furnished and installed by the unit manufacturer as a "turn-key" installation. Included in this work will be all NYC Building Department tiling, permits and sign-off.
- B. Electrical Connections: Refer to Division 26 for Equipment for final connections to equipment and installation of loose shipped electrical components.

3.03 CANOPY HOODS

- A. Unless indicated otherwise on drawings, suspend canopy hoods from top chord of joists, and adequately side-brace to prevent swaying.
- B. Install exhaust ductwork according to construction documents, NFPA and local regulatory requirements.
- C. Protect equipment in accordance with general conditions.

3.04 PERFORMANCE TESTING

- A. Upon completion of the installation of the Kitchen Exhaust/Make-up air System, a performance test shall be performed and witnessed by a representative of the Commissioner (NYC Mechanical Code Chapter 5, Section 507.1.6).
- B. Contractor to include provisions to perform all work to achieve final FDNY approval of installation.
- C. Kitchen exhaust fan and make-up air unit will continue to operate after the release of wet chemical fire suppression agent onto the cooking surface of kitchen equipment protected beneath the hood.

END OF SECTION

SECTION 23 6450 - HVAC EQUIPMENT

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, disassembly, re-assembly, and services necessary to furnish and install the HVAC equipment as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. VRF System
 - 2. Kitchen Exhaust
 - 3. Tail Pipe Exhaust
 - 4. Duct Collection System
 - 5. Welding Fume Collection System
 - 6. Make up Air Unit w/ Energy Recovery Wheel
 - 7. Pumps
 - 8. Boilers
 - 9. H & V Units
 - 10. Split AC Units
 - 11. CRAC Unit
 - 12. Variable Speed Pumps
 - 13. Exhaust fans

1.03 RELATED WORK

- A. 23 0500 COMMON WORK RESULTS FOR HVAC
- B. 23 0513 COMMON MOTOR REQUIREMENTS FOR HVAC
- C. 23 0593 TESTING, ADJUSTING & BALANCING FOR HVAC
- D. 23 0700 HVAC INSULATION
- E. 23 0900 INSTRUMENTATION & CONTROL FOR HVAC
- F. 23 2113 PIPING AND ACCESSORIES
- G. 23 2500 HVAC WATER TREATMENT
- H. 23 3113 METAL DUCTS
- I. 23 3117 ACOUSTICAL TREATMENT
- J. 23 3500 SPECIAL EXHAUST
- K. 23 3713 DIFFUSERS, REGISTERS & GRILLES

1.04 QUALITY ASSURANCE

- A. ANSI, ARI, ASME, AMCA, ASHRAE, ICC, NFPA, UL.
- B. Comply with requirements of all governing authorities having jurisdiction.

1.05 SUBMITTALS

- A. Make submittals on all items listed above in Section 1.02, Work Included.
- B. Shop drawings indicating size, location, details and installation requirements.
- C. Product Data: Manufacturers' printed data, catalog cuts, test data, performance curves, manufacturer's recommendations.
- D. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring for HVAC equipments. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- E. Operational and Maintenance Manuals: Manufacturer's instructions for operation and maintenance.

PART 2.00 - PRODUCTS

2.01 ENERGY RECOVERY UNIT

- A. Energy Transfer
 - 1. The ERV shall be capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.
- B. Passive Frost Control
 - 1. The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.
- C. Continuous Ventilation
 - 1. Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters or defrost cycles under normal operating conditions.
- D. Positive Airstream Separation
 - 1. Water vapor transfer shall be through molecular transport by hygroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall travel at all times in separate passages, and airstreams shall not mix.
 - 2. Unit shall be set up to provide zero cross contamination between air streams.
- E. Laminar Flow
 - 1. Airflow through the ERV core shall be laminar over the products entire operating airflow range, avoiding deposition of particulates on the interior of the energy exchange plate material.
- F. Construction
 - 1. The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.

2. No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.
3. The unit case shall be constructed of G90 galvanized, 20-gauge steel, with lapped corners and zinc plated screw fasteners.
4. Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets. Pressure taps, with captive plugs, shall be provided allowing cross-core pressure measurement allowing for accurate airflow measurement.
5. Case walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with minimum R-value of 4.3 (hr-ft²-°F/BTU).
6. The ERV cores shall be protected by a MERV-8 rated, 2" nominal, pleated, disposable filter in both airstreams.
7. Unit shall have single-point power connection and a single-point 24 VAC contactor control connection.
8. Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and be shall be supplied with factory installed VFDS.
9. Blowers shall be quiet running, forward curve type and be or belt drive. Belt drive motors shall be provided with adjustable pulleys and motor mounts allowing for blower speed adjustment, proper motor shaft orientation and proper belt tensioning.
10. The unit electrical box shall include a factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.
11. The ERV shall be provided "inverter-ready" allowing for applications of inverters supplied and installed by others.

G. Hot Water Coil

1. Provide all coils of the continuous tube type to have the dimensions, minimum number of rows and capacities as indicated in the schedule.
2. Construct coils of heavy gauge seamless copper tubing, approximately 5/8" O.D. with aluminum fins. Provide tubes expanded or joined in an approved manner to copper headers and connections. Each water coils to withstand the working pressure of the service. Provide coils with positive means for completely draining and venting each coil. Mount coils in suitable flanged galvanized steel casings.
3. All coil performance to be certified by the American Refrigeration Institute (ARI).
4. Provide suitable galvanized steel as required to properly mount coils.
5. Thoroughly test each coil before shipping. Coils shall proof at 300 psig and be leak tested with 200 psig air under water.
6. Each coil section in a bank of coils shall have separate valved supply and return connections.

H. Required factory options

1. Provide double wall construction with 24-gauge galvanized steel liner. Provide factory installed disconnect fuses.
2. Provide factory installed filter monitors for each airstream.
3. Provide MERV-13 filters for final installation after construction phase.
4. Provide factory installed Variable Frequency allowing either preset or variable speed operation with appropriate 0-10 volt DC or Direct Digital control signal.
5. Provide factory installed isolation dampers for both air. The insulated dampers shall be of a low leakage design and shall not restrict the airstream, reducing airflow, in any way. The dampers shall be opened with a motor actuator powered by the standard unit transformer package and have a spring return for low off-position power consumption.

I. Vibration Isolation

1. Provide rubber isolators appropriately sized for corner weights of the specific unit.

2. Provide flexible duct connections at unit duct flanges.

J. Units shall be manufactured by Renewaire, Venmar, Trane, McQuay or approved equal.

2.02 100% OUTSIDE AIR ROOFTOP HEATING AND COOLING UNIT W/ HEAT RECOVERY

A. Provide a factory-built and factory-tested rooftop heating and cooling unit of sizes, capacities configuration and electrical characteristics as scheduled and as specified herein. Units shall consist of casing, compressor, evaporator, condenser fans, supply and exhaust fan, hot-gas reheat coil, gas fire heater, energy recovery wheel, filters and unit control.

B. Units shall be rated in accordance with appropriate ARI Standards. Unit performance shall be in accordance with the NY Energy Conservation Code.

C. Unit Casing:

1. Unit shall be designed and built for outdoor installation. Unit casing shall be leaktight up to 3" negative static pressure. All roof and wall panels shall be made of heavy gauge galvanized steel welded to a 10-gauge welded, galvanized steel base channel. All seams shall be welded or bolted and sealed with a rubber-based mastic. External vertical seams shall be covered with a "U" clip, welded in place for additional weather protection. Use of sheet metal screws to fasten side walls to unit framework is not permitted. Lifting brackets shall be factory installed on single piece units. On multiple section units, removable lifting hangers shall be provided to permit unit to be lifted without slings.
2. Galvanized roof shall be pitched for drainage and shall overlap the side panel on all four sides. The roof shall be gasketed and secured to the wall panels with zinc-coated steel screws.
3. All exterior surfaces shall be finished with vinyl chlorinated lacquer for corrosion protection. Paint colors other than the manufacturer's standard shall match the paint chip furnished by the City of New York.

D. Energy Transfer

1. The ERV shall be capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.

E. Passive Frost Control

1. The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.

F. Continuous Ventilation

1. Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters or defrost cycles under normal operating conditions.

G. Positive Airstream Separation

1. Water vapor transfer shall be through molecular transport by hygroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall travel at all times in separate passages, and airstreams shall not mix.
2. Unit shall be set up to provide zero cross contamination between air streams.

H. Laminar Flow

1. Airflow through the ERV core shall be laminar over the products entire operating airflow range, avoiding deposition of particulates on the interior of the energy exchange plate material.

I. Construction

1. The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.
2. No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.
3. The unit case shall be constructed of G90 galvanized, 20-gauge steel, with lapped corners and zinc plated screw fasteners.
4. Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets. Pressure taps, with captive plugs, shall be provided allowing cross-core pressure measurement allowing for accurate airflow measurement.
5. Case walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with minimum R-value of 4.3 (hr-ft²-°F/BTU).
6. The ERV cores shall be protected by a MERV-8 rated, 2" nominal, pleated, disposable filter in both airstreams.
7. Unit shall have single-point power connection and a single-point 24 VAC contactor control connection.
8. Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and be shall be supplied with factory installed VFDS.
9. Blowers shall be quiet running, forward curve type and be or belt drive. Belt drive motors shall be provided with adjustable pulleys and motor mounts allowing for blower speed adjustment, proper motor shaft orientation and proper belt tensioning.
10. The unit electrical box shall include a factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.
11. The ERV shall be provided "inverter-ready" allowing for applications of inverters supplied and installed by others.

J. DX Coil

1. Provide all coils of the continuous tube type to have the dimensions, minimum number of rows and capacities as indicated in the schedule. Coils for full face active or face split operation shall have intertwined circuits for equal loading.
2. Construct coils of heavy gauge seamless copper tubing, .020" thick, approximately 5/8" O.D. with aluminum fins. DX coils shall be provided with pressure type brass distributors with soldertype, connections. All coils shall have a minimum of two distributors.
3. Provide a continuous horizontal stainless steel drip pan for each cooling coil section in height. Each drip pan to be individually drained to a drain header at the bottom.
4. All coil performance to be certified by the American Refrigeration Institute (ARI).
5. Provide suitable galvanized steel supports as required to properly mount coils.
6. Thoroughly test each coil before shipping. Coils shall proof at 300 psig and be leak tested with 200 psig air under water.
7. Coils shall have suction and discharge connections on the same end.

K. Required factory options

1. Provide double wall construction with 24-gauge galvanized steel liner.
Provide factory installed disconnect fuses.
2. Provide factory installed filter monitors for each airstream.
3. Provide MERV-13 filters for final installation after construction phase.

4. Provide factory installed Variable Frequency allowing either preset or variable speed operation with appropriate 0-10 volt DC or Direct Digital control signal.
5. Provide factory installed isolation dampers for both air. The insulated dampers shall be of a low leakage design and shall not restrict the airstream, reducing airflow, in any way. The dampers shall be opened with a motor actuator powered by the standard unit transformer package and have a spring return for low off-position power consumption.

L. Vibration Isolation

1. Provide rubber isolators appropriately sized for corner weights of the specific unit.
2. Provide flexible duct connections at unit duct flanges.

M. Units shall be manufactured by Renewaire, Venmar, Trane, McQuay or approved equal.

2.03 DUCT FURNACE

- A. Provide a gas-fired duct furnace of the sizes and capacities as scheduled and as specified.
- B. Unit shall be of the vented type equipped with stainless steel heat exchanger with bypass and built-in draft hood.
- C. Unit shall be capable of modulating burner operation, 25% to 100%.
- D. Unit shall be equipped with 24 volt controls, including transformer, combination valve consisting of automatic electric gas valves, pilot filter, pressure regulator, pilot shutoff and manual shutoff.
- E. Unit shall be rated for outdoor use
- F. Unit shall be manufactured by ITT Reznor or approved equal.

2.04 COMPUTER ROOM UNITS

- A. Provide computer room air conditioning unit of the sizes and capacities as scheduled and specified.
- B. Units shall be configured for:
 1. Air discharge via factory plenum, with adjustable directional grilles.
- C. Unit shall be provided with direct expansion coil split in two equal circuits. The coil shall be of copper tube, aluminum fin construction and shall have stainless steel supports.
- D. Each refrigeration circuit shall be complete with liquid line solenoid valve, replaceable filter-dryer, pressure relief valve, liquid and moisture indicator, thermal expansion valves with external equalizer and liquid line shut-off valves with charging port. Refrigerant-410A shall be used. Refrigeration circuits, including expansion valves shall be serviceable and adjustable while unit is operating. Each refrigeration circuit shall be fully charged and ready for operation, requiring only connection of services and opening of service valves. The complete refrigeration circuit shall be located out of the supply air stream.
- E. Each unit shall have compressors with anti-slug protection, complete with discharge and suction shut-off valves, each with gauge ports. Compressors shall be capable of being demounted from the cabinet without moving other components and without cutting into piping. Compressors shall be equipped with crankcase heaters. A compressor sequence switch shall be provided for changing lead-lag sequence of the compressors. The switch shall be located within the electrical control panel.
- F. Each refrigeration circuit shall have flooded head pressure control located in the base of the unit, out of the supply air stream. It shall be adjustable and set to maintain a constant condenser and receiver pressure under various fluid temperatures, eliminating the possibility of compressor short-cycling. The head pressure control shall operate under any fluid temperature. The flooded head pressure control shall have a factory-mounted liquid receiver, large enough to hold the entire flood back charge. Each receiver shall be fitted with all necessary line shutoff valves to permit it to be isolated from the refrigeration circuit for service. A purge valve shall be factory-installed on the receiver.
- G. Air Cooled Condenser:

1. The unit casing shall be constructed of heavy-gauge, corrosion-resistant aluminum, thoroughly reinforced with bolted gussets of aluminum and galvanized steel. On multiple-fan models the casings shall be divided by full-width, heavy-gauge aluminum baffles which shall separate the individual fan section and provide additional casing reinforcement.
 2. Coils shall be constructed of 2" O.D. seamless copper tubing mechanically expanded into ten (10) aluminum collar fins per inch. Sixteen-gauge (16 ga.) galvanized steel tube sheets with expanded collars shall be used for tubing support. Removable covers shall be provided.
 3. Propeller fan shall be direct driven and shall have aluminum blades and zinc-plated hub. Fan guard shall consist of heavy-gauge steel wire, zinc-plated and Iridite-dipped. Fan motors shall be permanent, split-capacitor type, approved for outdoor use, with inherent built-in thermal overload protection. Motor leads shall terminate in a cabinet-mounted, weatherproof junction box. Permanently lubricated ball bearings shall be used.
 4. Provide low ambient head pressure control to operate down to 0 degrees F.
- H. Computer room unit cabinet shall be #14 gauge furniture steel construction with a 3/16" galvanized steel base. Cabinet shall be finished in a color and texture matching the computer cabinets. Each unit shall have full front access and be fully serviceable from the front, while providing access from the sides, thus allowing the unit to be positioned within 3" or rear wall. Access panels, with handles, shall be set on neoprene gaskets with recessed, self-tightening latches to prevent air leakage. Casing and panels shall be lined with thermal and acoustical insulation of one inch (1") thick, 12 lb. density glass fiber, neoprene-coated on exposed surface. Unit shall be arranged to provide full service access to all electrical controls and complete refrigeration section without interrupting system operation. Unit shall be sectionalized to facilitate, if required, shipping separate fan and refrigeration sections to the job site without the need for field piping wiring.
- I. Supply air fans shall be forward-curved, double-width, double-inlet centrifugal type, mounted on a single fan shaft, ground polished and coated with rustproof compound. The fan shaft shall be selected to operate at 75% of its first critical speed. Fan shaft bearings shall be self-aligning type, permanently lubricated and selected for minimum 100,000-hour life span. The entire fan assembly shall be dynamically balanced at the factory to a maximum tolerance of 2 miles in any plane.
- J. Supply air fan motors shall be three phase, NEMA design "B", 40 continuous rating. Motor shall be NEMA "T" frame, open, dripproof, 1750 RPM, supplied with grease relubricable ball bearings. Motor base shall provide for sliding, fine adjustment with positive lock for maintenance of proper belt tension. Motor leads shall be factory wired, terminating in a convenient junction box. Adjustable, dual V-belt drive shall be sized for 200% BHP, with heavy cast iron sheaves, designed for continuous operation. Single belt drives are unacceptable.
- K. Air filter section shall be top-mounted and quickly detachable without the use of mechanical fasteners. Filters shall be housed in a fitted rack and shall be accessible from top, front or side of unit. High efficiency filter shall be of pleated type with high dirt holding capacity and shall be rated at a 36.5% efficiency by National Bureau of Standards test method.
- L. The cooling coil drain pan shall be sloped, self-cleaning, and shall be stainless steel construction with non-ferrous connections and shall include a factory-installed copper drain trap with removable brass cleanout plug.
- M. The humidifier shall be of the infrared type consisting of high intensity quartz lamps mounted above and out of the water supply. The evaporator pan shall be stainless steel and arranged to be serviceable without disconnection high voltage electrical connections. The complete humidifier section shall be prepiped ready for final connection. The infrared humidification system shall use bypass air to prevent over-humidification of the computer room. The humidifier shall be equipped with an automatic water supply system. The system has an adjustable water-overfeed to prevent mineral precipitation.
- N. The humidifier shall be supplied with an automatic flush cycle which shall wash the humidifier pan after the humidifier has been in operation for a predetermined time period. This flush cycle shall eliminate sediment within the steam vessel and virtually eliminate cleaning maintenance.
- O. Each unit shall be complete with a hot gas reclaim coil using the compressor discharge gas for reheating purposes. The hot gas reclaim system shall be complete with a special three-way valve and a refrigerant check valve.

- P. All branch circuits shall be individually fused and shall include a 24 volt control transformer from which all magnetic starters and control devices shall operate. All magnetic starter shall have three line, three-coil, ambient-compensated overload protection, with manual reset. Refrigeration cycle shall be fitted with a low and high pressure cutout switch, with manual reset on high pressure cutout. A compressor sequence switch shall be provided for sequencing lead-lag control of the compressors. All line voltage wiring shall be in conduit. No wiring shall be less than #18 AWG for low voltage or #14 gauge AWG for line voltage.
- Q. The information display panel shall be front-mounted and contain a three-position switch, an alarm silencing switch, push-to-test light switch and twelve (12) system pilot lights to indicate: SYSTEM ON, POWER ON, each stage of COOLING and HEATING, compressor outage due to HIGH HEAD pressure, HUMIDIFICATION, DEHUMIDIFICATION, HIGH RETURN AIR TEMPERATURE and CHANGE FILTER. Each light and switch station shall be identified permanently by engraved lettering. Unit to have automatic restart five (5) minutes after corrected power interruption.
- R. Unit shall be quipped with electro-mechanical control system for fully automatic operation. Unit shall have two (2) stages of cooling, two (2) stages of heating and individual high and low limit humidistats, set up for operation with a preset deadband between cooling and heating, and between humidifying and dehumidifying. Control settings and deadbands shall be field adjustable. Control settings and deadbands shall be field adjustable. The tolerances shall be +2 FDB and +5% RH.
- S. The unit shall be complete with a remote status panel with lights and alarms for indicating failure to any unit. The panel shall indicate which units are operational. Panel shall be complete with alarm silencing switch and a push-to-test system switch.
- T. Unit shall be complete with factory-wired condensate sump pump. Pump shall be included in a welded, stainless steel tank. Pump package shall be complete with high and low level electrodes. If pump should fail, the unit shall be shut down automatically.
- U. The unit shall be provided with a water detection system to detect the presence of free water. System shall be factory wired and installed, and shall include detector probes for remote field location. System shall include light display and audible alarm.
- V. Unit shall be fitted with a pressure differential switch which shall sense loss of air flow through the unit and shut down the unit.
- W. The unit shall be supplied with a main circuit interrupter for disconnecting electric power to the unit from the exterior of the unit cabinet without having to open the cabinet doors.
- X. Unit shall be manufactured by Liebert, Blazer or approved equal.

2.05 AIR-COOLED CONDENSING UNITS

- A. Provide a factory-built and factory-tested condensing unit consisting of casing, compressors, condenser coils, condenser fans and motors, and unit controls. Provide units of sizes, capacities, and electrical characteristics as scheduled.
- B. Units shall be rated in accordance with the appropriate ARI Standard. Unit performance shall be in accordance with the NY Energy Conservation Code.
- C. Casings shall be designed for outdoor installation and provide weather protection for components and controls. Provide removable panels for required access to compressors, controls, condenser fans, motors and drives. Provide galvanized steel for exposed casing surfaces, phosphatized, and finished with manufacturer's standard paint coating. Provide lifting lugs to facilitate rigging of units. Provide metal grilles, factory-installed, for protection of condenser coil during shipping, installation and operation.
- D. Provide scroll compressor with built-in overloads and vibration isolation. Provide, for compressor motor, thermal and current sensitive overload device, integral high-pressure protection, high and low pressure cutout switches, start capacitor and relay, 2-pole contactor, crankcase heater, and temperature actuated switch and timer to prevent compressor rapid cycle. Provide sound hood and vibration isolator plate.

- E. Construct condenser coil of copper tubes and aluminum fins, provided with liquid accumulator and liquid subcooler. Provide aluminum propeller fan, direct driven, with permanently lubricated ball bearing fan motor with thermal overload protection. Provide liquid line solenoid valve.
- F. Provide propeller-type condenser fans for vertical air discharge. Provide either direct drive or belt drive fans and motors. Provide permanent lubricated ball bearing condenser fan motors. Provide separate motor for each condenser fan. Dynamically and statically balance each fan assembly.
- G. Controls:
 - 1. Provide operating and safety controls, including high and low pressure cutouts, oil pressure cutout, and compressor winding thermostat cutout. Provide three-leg compressor overload protection. Protect condenser fan motors with thermal and overload cutouts. Provide control transformer as required for 115V control power. Provide magnetic contractors for compressor condenser fan motors.
 - 2. Provide automatic non-recycling pump down and timing device to prevent excessive compressor cycling.
 - 3. Winter start control.
 - 4. Evaporator freeze thermostat.
 - 5. Compressor start assist capacitor and relay.
 - 6. Provide low ambient controls to either modulate condenser fan motor speed or modulate factory-installed low ambient damper assembly based on lead pressure. Unit shall be capable of operating down to 0 degree F.
- H. Units shall be manufactured by same manufacturer as air handling unit it serves unless otherwise specified. Unit shall be manufactured by Carrier, McQuay, Trane, York or approved equal.

2.06 FAN COIL UNITS

- A. Provide factory-built and tested fan coil units of the type, size and capacity as scheduled and as specified herein.
- B. The unit shall be two-pipe complete with cabinet enclosure, fan motor, DX coil, auxiliary drain pan, filters, motor speed controller and enclosure.
- C. Units and application rating data to bear the ARI seal, certifying conformance with Industry Standard 441.
- D. Unit shall be designed for horizontal or ceiling-hung application.
- E. Construct the units of 18 gauge zinc coated sheet steel. The removable fan board and drain pan assembly formed from a single piece of metal without joints. Exterior surface of drain pan insulated with 3/16" insulation. The enclosure lined with 2" glass fiber insulation, securely fastened with a weatherproof adhesive.
- F. The fans to be forward curved double width wheels. The wheel and scroll constructed of galvanized or aluminum construction. Mount fan and motor assembly on acoustically treated reinforced galvanized steel panelboard removable as a unit.
- G. Coils constructed of 5/8" OD copper tubes with .025" wall thickness and mechanically expanded into aluminum fins. Coils suitable for a working pressure of 250 psig. Furnish manual air vent.
- H. Motors to be three-speed, split capacitor type designed for positive speed reduction with inherent overload protection and mounted on a resilient base. The fan and motor readily removable and provided with a quick disconnect of the motor cord.
- I. Filter shall be 1" thick fiberglass throwaway type, spring clip fastened.
- J. Controls:
 - 1. All controls shall be low voltage (24 volts). Provide transformer as required.
 - 2. Fan control shall be a four-position fan switch, "off-high-normal-low", with motor contactors and interconnecting wiring to electrical connection box.
 - 3. Ceiling units shall have remote thermostat and fan speed switch.

- K. Unit shall be manufactured by Enviro-Tec, Carrier, International, McQuay, Trane, York or approved equal.

2.07 FANS – GENERAL

- A. Test and rate all fans in accordance with the standards of the AMCA. All fans must bear the AMCA certified rating seal.
- B. Make appropriate allowances for the effects on fan performance of all installation conditions including plenum enclosures and inlet and discharge arrangements so that actual installed fan performance equals that specified.
- C. Balance all fan wheels and all other moving components statically and dynamically. Where a coating is specified and it affects the balance of the fan wheel, perform the balancing after the coating has been applied.
- D. Drill all fan shafts on the center line to receive a tachometer point.
- E. Fans shall operate stably without pulsation at design conditions. Centrifugal fan characteristic curves must be such that the fan operating point falls below the point of no flow static pressure, to the right of the point corresponding to that of maximum mechanical efficiency, and a 15% increase in static pressure over that specified results in not more than a 15% a reduction in cfm and does not affect the stability of fan operation. If necessary, accomplish the foregoing by modifying the width of the fan wheel and/or by providing inlet vanes to change the characteristic curve.
- F. In addition to other data regarding fan construction and performance, submit to the COMMISSIONER for approval complete certified data for each fan with additional copies for inclusion in the Instruction Manual as follows:
1. Curves showing at the fan speed indicated on the drawings, the relationship between the air handled by the fan from zero to the maximum obtainable in cfm and the static pressure developed, static efficiency, motor horsepower (including drive losses), and sound power levels in decibels in each of the eight octave bands.
 2. Correction chart for fans equipped with variable inlet vanes indicating performance at various percentages of opening.
 3. Data relating to sound level produced at the fan outlet when operating at design conditions in accordance with AMCA Bulletin 300, Recommended Practice for Sound Testing of Air Moving Devices.
- G. Fan shaft shall extend a minimum of 3" beyond the hub of the belt sheave.
- H. Provide adjustable V-belt drive for all belt-driven fans.
1. Sheaves for motor of less than 15 HP shall be adjustable, plus or minus 10%. When the motor is 15 HP or over, use companion type sheaves. Service rating shall not be less than 150% of the maximum estimated load. Select sheave sizes to minimize fan and motor shaft overhung load. Arc of contact of the belt on smaller sheave shall not be less than 120.
 2. Belts shall be reinforced rubber or neoprene, as manufactured by Eaton HY-T multi-wedge drive, Browning Grip Belt or approved equal.
 3. Minimum efficiency shall be 95%.
 4. Submit all selection calculations.
 5. Equipment RPM's indicated on drawings are for selection guidance only. Provide sheaves as required by manufacturer's ratings. Provide additional sheaves as required for balancing at no extra cost to the City of New York.
- I. Provide inlet guards where fan inlets are not connected to ductwork, at double inlet fans within casings, and at single inlet fans connected to walk-in casings. Inlet guards shall be constructed of 2" X 2" heavy gauge galvanized steel wire. Guards shall be securely fastened in place and designed for easy removal. Guards shall meet all OSHA requirements.
- J. For all fans located outdoors, except roof ventilators exposed to the weather, provide custom fitted weather guards completely enclosing the fan motor, drive and bearings. Provide weatherproof louvers

in the enclosure to permit circulation of air but to exclude rain and snow. Arrange one side of the enclosure to be completely removable for access to motors, drives, bearings and other equipment located within requiring maintenance. Construct the enclosure of 16-gauge aluminum, braced with aluminum angles. Paint the fan exterior with two coats of weatherproof aluminum paint.

2.08 EXHAUST FANS

- A. Provide a factory-built and tested exhaust fans of sizes and capacities as scheduled and as specified herein.
- B. Roof Exhaust Fan – Centrifugal:
 - 1. Provide a motor-driven fan unit built into weathertight housing, designed for roof curb mounting.
 - 2. Fan wheel shall be backward curved, non-overloading, centrifugal, die-formed welded steel or aluminum driven through an adjustable V-belt drive.
 - 3. Fan shall be forward curved centrifugal, die-formed welded steel or aluminum directly driven by motor.
 - 4. Fan motor shall be dripproof sealed ball bearings with disconnect switch located outside the air stream. Built-in thermal overload protection. Mount the motor on a rigid welded steel chassis floated on rubber vibration isolators. Provide disconnect switch factory installed under weather-proof dome.
 - 5. Provide a prefabricated aluminum insulated roof curb. Minimum curb height 12". (18" CURB FOR KITCHEN EXHAUST SYSTEMS)
 - 6. Provide an aluminum motorized automatic damper.
 - 7. Provide a weatherproof exhaust hood made of all aluminum, low contour, readily removable for complete accessibility to all operating parts. Screen air discharge with 2" aluminum (.047") bird screen.
 - 6. Provide a weatherproof exhaust hood made of all aluminums, low contour, readily removable for complete accessibility to all operating parts. Hood shall have a vertical air discharge pattern and shall be screened with expanded metal bird guard. Provide forced motor cooling through breather tube. Provide a 1¼" drain connection with grease container.
- C. Wall Exhaust Fan – Centrifugal:
 - 1. Provide fan compressor with motor, metal frame, drive assembly and motorized damper.
 - 2. Housing shall be aluminum construction with bird screen.
 - 3. Fan wheel shall be backward curved aluminum airfoil type centrifugal fan wheel.
 - 4. Fan shall be directly connected to motor. Motor shall have built-in thermal overload protection.
 - 5. Provide fan with automatic motor operated damper.
- D. Propeller Fans:
 - 1. Provide a propeller fan complete with motor, reinforced metal frame, isolators, drive assembly and safety guards.
 - 2. Wheel shall have die-formed steel or aluminum propeller blades.
 - 3. Provide motor speeds and drive as scheduled.
- E. In-Line Centrifugal
 - 1. Fan shall have cylindrical in-line arrangement with bell-shaped inlet, centrifugal wheel, stationary aerodynamic conversion vanes and discharge cone, arranged for horizontal or vertical mounting.
 - 2. Casing shall be steel sheet rigidly braced and completely welded airtight with gasketed access door with quick-opening latches, and support legs for horizontal mounting or welded steel brackets for vertical mounting.
 - 3. Wheel shall be non-overloading centrifugal with backwardly incline die-formed blades continuously welded to the supporting members.
 - 4. Shaft shall be hot rolled steel, ground, polished and keyed to the wheel.
 - 5. Bearings shall be heavy duty self-aligning permanently sealed bass or roller, pillow block type with external grease fittings.
 - 6. Drive shall be adjustable V-belt, or direct driven as indicated on schedules. Motor shall be mounted on casing assembly outside of air stream.

7. Casing shall have 1" acoustical lining.
 8. Fans shall be provided with motorized automatic dampers.
- F. Tubular In-Line Centrifugal:
1. Fan shall have tubular in-line arrangement with bell-shaped inlet, centrifugal airfoil wheel, stationary aerodynamic conversion vanes and discharge cone, arranged for horizontal or vertical mounting.
 2. Housing shall be steel sheet rigidly braced and completely welded airtight and support legs for horizontal mounting or welded steel brackets for vertical mounting.
 3. Wheel shall be non-overloading centrifugal with airfoil blades continuously welded to the supporting members.
 4. Shaft shall be hot rolled steel, ground, polished and keyed to the wheel.
 5. Bearings shall be heavy duty self-aligning permanently sealed ball or roller, split pillow block type with external grease fittings, selected for a minimum average of 200,000 hours life. When used for kitchen exhaust, bearings shall be located out of air stream.
 6. Drive shall be adjustable, V-belt, as indicated on schedules. Motor shall be mounted on housing assembly outside of air stream.
 7. Fans shall be provided with steel belt guards.
- G. Utility Set:
1. Fan shall be factory assembled with all components mounted on a reinforced steel stand.
 2. Casings shall be steel volute, rigidly reinforced and supported, seams permanently sealed airtight.
 3. Wheel shall be non-overloading centrifugal with backwardly inclined die-formed steel blades welded or riveted to the side and hub plates. (Forward curved blades are permissible for less than 10" wheel diameter).
 4. Shaft shall be hot rolled steel, ground keyed to the wheel.
 5. Bearings shall be self-aligning ball, pillow block type.
 6. Drive shall be adjustable V-belt.
 7. Motor and drive enclosure shall be sheet steel, securely fastened weathertight and easily removable.
- H. Where used as kitchen exhaust, provide arrangement No. 1 fan with heat slinger, drain connections, shaft seal and bearings located out of air stream.
- I. Exhaust fans shall be manufactured by Greenheck, Loren Cook, Penn Ventilator or approved equal.

2.09 PUMPS – GENERAL REQUIREMENTS

- A. Construct all pumps of materials and pressure ratings suitable for the conditions encountered during continuous operation.
- B. Where corrosion can occur, appropriate corrosion-resistant materials and assembly methods must be used including isolation of dissimilar metals against galvanic interaction.
- C. Where components are or may come in contact, although the materials may basically be similar, use hardness differentials of at least 50 Brinnell to prevent seizure and reduce wear.
- D. Balance impellers and all other moving components statically and dynamically.
- E. Provide shaft packing or seals compatible with the pump design, fluid handled and in accordance with the manufacturer's recommendations.
- F. Provide pump with coupling and shaft guard in accordance with ANSI B15.1 Section 8.
- G. Match centrifugal pump impellers and casings so that at specified operating conditions the impeller diameter is not more than 72% of the cut water diameter of 85% of the maximum catalogued impeller size, whichever is less.

- H. Pumps must operate quietly, smoothly and stably without cavitation, pulsation, vibration or internal recirculation. Pump operating characteristic curves must meet the following requirements:
 - 1. The pump NPSH requirement must be less than the available system NPSH.
 - 2. The pump operating point must fall below the point of no flow head pressure.
 - 3. Pump shall be furnished to operate at or near the point of peak efficiency. Pump curve shall be continuously rising from design capacity up to shut-off point to ensure stable operation and prevent any possibility of hunting.
- I. Furnish pumps so that when operating at rated rpm the pump motor cannot be overloaded despite variations in pumping head over entire range of curve. Brake horsepower and motor horsepower shall conform with the equipment schedule. If a particular manufacturer's selection cannot conform to the above, any mechanical or electrical adjustments necessitated by a larger motor shall be at no cost to the City of New York and shall be subject to approval by the COMMISSIONER.
- J. Where initial and ultimate operating conditions are specified, these shall be achievable by changing the pump impeller with no modifications to the casing.
- K. Provide nameplates attached to pumping unit showing the following information:
 - 1. Maker's name, date of manufacturer, size and type.
 - 2. Rated capacity, head and RPM at full load.
 - 3. Rated horsepower, full load amperes.
 - 4. Voltage, number of phases, frequency.
 - 5. Temperature rise or class of insulation.
 - 6. Service factor, if other than 1.0.
 - 7. Impeller diameter, impeller model and stages.

2.10 VARIABLE SPEED PUMPING SYSTEM

- A. Provide an integrated variable speed constant pressure pumping system consisting of a pump, motor, adjustable frequency drive, floor stand, controller and controls.
- B. Pump shall be for the services and of the type as specified below:
 - 1. GEO THERMAL WATER PUMP - SINGLE SUCTION.
 - 2. HOT WATER PUMP - SINGLE SUCTION.
- C. Controller and adjustable frequency drive shall be housed in a NEMA 1 ventilated enclosure with hinged latching door. The controller shall contain all required solid state electronics to convert incoming fixed frequency (60 Hertz) power to adjustable frequency power to infinitely vary speed of the motor. In addition to the adjustable frequency electronics package, the controller shall be provided with the following:
 - 1. Circuit breaker, phase loss detector circuit, thermal overload protection, control transformer, manual-off automatic switch, hand potential meter for manual speed control, fuses and running pilot lights.
 - 2. Motor control and protection shall be provided by motor thermal switches, a thermal overload relay and magnetic adjustable trip circuit breaker.
 - 3. All power wiring rated for 600 volts.
 - 4. Numbered terminal block.
- D. Controls shall include:
 - 1. Lead-lag selector switches for multiple pumps.
 - 2. Pressure sensors, transducers and transmitters.
 - 3. Analog input tracking circuit.
 - 4. Low suction pressure cut-out.
 - 5. Automatic restart.
 - 6. Tachometer.
 - 7. Auxiliary contacts (one pair normally open and one pair normally closed).
- E. The pump shall be hydrostatically tested at the factory. All electronics and control equipment shall be completely tested to assure proper functioning of each component and of the system.

- F. The pump manufacturer shall assume unit responsibility and shall provide a factory instructed engineer to supervise initial start-up, to insure proper operation of the system, and to instruct the operating personnel in the operation and maintenance of the system. Two days of on-site instruction shall be provided.
- G. The variable speed pumping system shall be manufactured by Aurora Pump, Bell and Gossett or approved equal.

2.11 IN-LINE CIRCULATING PUMP—ECM MOTOR & VARIABLE SPEED

- A. Pumps shall be single suction centrifugal in-line type of the sizes, capacities, and electrical characteristics as scheduled for mounting in pipeline, close-coupled to electric motor. It shall be possible to remove motor without removing pump from pipeline.
- B. Pumps shall have ECM motors to provide variable speed using Autoadapt controls as standard.
- C. Casing shall be cast iron or stainless steel, vertically split, bolted at the division, flanged piping connections.
- D. Impellers shall be fully enclosed, bronze, keyed to the shaft.
- E. Shafts shall be Type 316 stainless steel, ground smooth.
- F. Shaft seals shall be mechanical, hardened ceramic and carbon sealing faces.
- G. Bearing shall be oil lubricated, external cups.
- H. Couplings shall be self-aligning, flexible type.
- I. Provide built-in motor thermal overload protection (with automatic restart).
- J. Pumps shall be rated for 100 psi and 225°F.
- K. Pumps shall be manufactured by Grundfos Model Alpha or Magna, Bell and Gossett, Federal, Taco or approved equal.

2.12 COLD CONDENSATE PUMP (FOR A/C APPLICATIONS—NOT TO BE INSTALLED IN A RETURN AIR CEILING PLENUM)

- A. Provide condensate pumps with integral ½-gallon ABS tank, Hi-level safety switch, check valve, float switch, stainless steel motor shaft, 6 foot cord and plug, UL listed and thermal overload protection.
- B. This pump shall NOT be used in a return air plenum.
- C. Pump shall be Little Giant Model VCMA-20ULS, Diversitech CP-22, Hartell A2 or approved equal.

2.13 COLD CONDENSATE PUMP (FOR A/C APPLICATIONS—FOR RETURN AIR CEILING PLENUMS)

- A. Provide condensate pumps with integral 1-gallon cast aluminum tank, Hi-level safety switch, check valve, float switch, stainless steel motor shaft, junction box wire connections, UL listed and thermal overload protection.
- B. This pump shall be plenum rated UL 2043.
- C. Pump capacity shall be 51 gallons/hour at 20 feet of lift. 22 foot shut-off head.
- D. Motor shall be 115 volt/1 phase/60 HZ, 1/10 HP.
- E. Pump shall be Hartell Model A2X-1965 DV, Little Giant VCC-20ULS, RectorSeal Might Pump or approved equal.

2.14 COLD CONDENSATE PUMP—FOR CONSOLE FAN COILS OR DUCTLESS VRF INDOOR UNITS

- A. Provide condensate pump complete with pre-filter, reservoir, pump, inlet and discharge and breather tubes.
- B. Pump shall be hard-wired with 6 foot cable, UL listed and inline fuse protection.
- C. The pump's capacity shall be 3.7 GPH at Zero head with a maximum lift of 26 feet, and a maximum sound level of 21 DBA.
- D. Pump shall be Aspen Mini Aqua ASP-MA-UNI, Little Giant 553455 EC-400, SAUERMAN SI3100SIU23 or approved equal.

2.15 HYDRONIC SYSTEM PRESSURIZATION AND AIR ELIMINATION

- A. General:
 - 1. Provide as shown on the drawings, a pressurization, air elimination, and automatic fill system to accommodate the expanded water generated by the increase in temperature in the water system and to control the increase in pressure at all critical components in the system to the maximum allowable for those components.
 - 2. The pressurization and air elimination system shall ensure that all air in the system shall be eliminated. The only air in the system shall be the permanent sealed-in-air cushion contained in the pressurization controller component of the system, a diaphragm-type expansion tank, pre-charged to the minimum operating pressure at the location indicated on the drawing.
 - 3. All free air originally contained in the system, and all entrained air bubbles carried by system water shall be eliminated at all points in the piping system where the capability of water to hold air in solution is lowest (the point of lowest solubility), and as indicated on the drawings. The air separating and elimination component shall separate entrained air from flowing system water by the creation of a vortex which will allow free air to rise in the center, the point of lowest velocity, to an air elimination valve.
 - 4. For automatic system fill provide a combination back flow preventer and feed water pressure regulator similar to Watts Model 9D and 1156F.
 - 5. Provide a pressurization and air elimination system for each hydronic system.
- B. Expansion Tank (Bladder Type Pre-Pressurized):
 - 1. The expansion tank shall be welded steel construction with a heavy duty butyl bladder and shall be pre-charged to the minimum operating pressure.
 - 2. Provide steel saddles for horizontal mounting.
 - 3. Tank shall be provided with air charging valve.
 - 4. Tank shall be suitable for 125 PSIG working pressure - 240°F maximum operating temperature and shall be tested at 250 psi.
 - 5. Tank construction and testing shall be in accordance with section VIII of the ASME code for unfired pressure vessels and shall bear the ASME stamp.
 - 6. Expansion tank shall be manufactured by AMTROL Inc. or approved equal.
- C. Air and dirt Separator:
 - 1. Furnish and install as shown on the drawings a combination full flow coalescing type high efficiency air eliminator / dirt and sediment separator on the geothermal and hot water systems.
 - 2. Pipe size is not a factor and all units should be selected at the point of peak efficiency per the manufacturer's recommendations.
 - 3. Air eliminators / separators shall be fabricated steel, rated for 150 psig working pressure with entering velocities not to exceed 4 feet per second at specified GPM. Designated models specifically designed for high velocity systems may have an entering velocity of up to 10 feet per second.
 - 4. Vessel diameter shall be a minimum of two times pipe size. Vessel height above the nozzle center-line shall be a minimum of 3 times pipe size for standard units and 4.5 times pipe size for high velocity units. Vessel shall extend below nozzle center-line the same distance for dirt separation.

5. Units shall include an internal coalescing bundle filling the entire vessel to suppress turbulence and provide high efficiency. The bundle shall consist of a copper core tube with continuous wound copper medium permanently affixed to the core. A separate copper medium is to be wound completely around and permanently affixed to each internal element.
6. Each eliminator shall have a separate venting chamber to prevent system contaminants from harming the float and venting valve operation. At the top of the venting chamber shall be an integral full port float actuated brass venting mechanism.
7. Units shall include a valved side tap to flush floating dirt or liquids and for quick bleeding of large amounts of air during system fill or refill.
8. Unit shall include a blow down valve at bottom for removal of collected dirt and sediment.
9. Air eliminator function shall be capable of removing 100% of the free air, 100% of the entrained air, and up to 99.6% of the dissolved air in the system fluid during continuous circulation.
10. Dirt and sediment separator function shall be capable of removing 80% of particles 30 micron and larger within 100 passes. A properly selected strainer (see strainer specification) shall be installed upstream to collect large debris that may be left in the piping.
11. Provide removal head to facilitate internal element inspection or cleaning if required. coalescing elements shall include tube sheets top and bottom and be manufactured as a bundle for ease of removal. Verify space required for bundle removal.
12. separator shall be manufactured by AMTROL Inc. or approved equal.

D. Air Elimination Valve (Automatic):

1. The air elimination valve shall be constructed of metal and all working parts shall be non corrosive and self-cleaning. Working pressure shall be 125 PSIG.
2. The valve shall be capable of removing air at all pressures in the operating range from 2 psi to 150 psi.
3. Valve shall be tightly sealed against loss of system water and prevent the entrance of air in negative pressure situations.
4. Valve shall be manufactured by AMTROL Inc. or approved equal.

2.16 CABINET HEATERS

- A. Provide cabinet heaters of the sizes, capacities and heating medium as scheduled and as specified.
- B. The cabinet heaters' casing shall be constructed of corrosion-resistant 16 gauge steel. Cabinet heater shall be equipped with a removable front for access to the interior.
- C. Heating elements shall be copper tube with aluminum fins. Headers shall be of heavy gauge steel and be provided with an air vent. Heating element shall be of the multipass serpentine type.
- D. Cabinet heater shall have two blow-through double inlet aluminum fans. Fan housing and motor shall be mounted as an integral assembly on a common base. Motor shall be provided with a built-in overload protection.
- E. A thermostat and three-speed controller shall be provided and mounted on the unit.
- F. Cabinet heaters shall be provided with renewable type filter.
- G. Cabinet heaters shall be as manufactured by Airtherm, Trane or approved equal.

2.17 UNIT HEATERS (HYDRONIC)

- A. Provide unit heaters of the sizes, capacities and heating medium as scheduled and as specified.
- B. Provide propeller type unit heaters constructed for 150 psig working pressure. Construct unit heater of copper coils, motor-driven propeller type fans, all installed in an attractive metal casing, finished with baked-on enamel. Motor speeds not to exceed 1,500 rpm.
- C. Provide an "on-off-automatic" starter providing overload protection, and a line voltage thermostat.

- D. The heaters to be controlled automatically by means of thermostats to start and stop the fans. The thermostats to be adjustable and designed to operate on a 3°F differential over a temperature range of approximately 45°F - 75°F. Install an aquastat in the supply connection to each heater, wired to prevent the fan from operating when there is no heat available.
- E. Each unit heater shall be properly supported from building construction and braced, as necessary, to prevent sway.
- F. Unit heaters shall be manufacturers by Airtherm, Trane or approved equal.

2.18 UNIT HEATERS (ELECTRIC)

- A. Provide electric resistance unit heaters of the sizes and capacities as scheduled and as specified.
- B. Provide propeller type unit heaters with electric heating element constructed for motor-driven propeller type fans, all installed in an attractive metal casing finished with baked-on enamel. Motor speeds not to exceed 1,500 rpm.
- C. Provide an "on-off-automatic" starter providing overload protection and a low-voltage thermostat, control transformer, and contactor.
- D. Controls shall consist of thermostat and a fan delay switch to prevent the fan from starting until the heating element is warm.
- E. Each unit heater shall be properly supported from building construction and braced, as necessary, to prevent sway.
- F. Unit heaters shall carry UL label and shall be manufactured by Emerson Chromalox, American Air Filter, Berko or approved equal.

2.19 CABINET/WALL HEATER (ELECTRIC)

- A. Cabinet unit heater shall be a complete factory-assembled package consisting of cabinets, fans, heating elements, power disconnect switch, motors and controls.
- B. Cabinet: Rust-protected steel with 16 gauge front panel. Front discharge, front inlet. Baked enamel finish. Color as approved.
- C. Heating Element: Finned tubular heating elements. Provide individual circuit protection as required by the National Electrical Code.
- D. Fans: Aluminum construction directly connected to fan motor.
- E. Motors: Heavy-duty totally enclosed type motors with built-in automatic reset overload protection.
- F. Controls: Provide the following integrally mounted and wired controls:
 - 1. Automatic reset thermal protection.
 - 2. Built-in tamper-resistant thermostat.
 - 3. Fan only selector switch.
- G. Size, capacity and mounting as indicated on drawings.
- H. Manufacturers: Emerson-Chromalox or approved equal.

2.20 BOILERS – GENERAL REQUIREMENTS

- A. Construct all apparatus of materials suitable for the conditions encountered during operation.
- B. Where corrosion can occur, appropriate corrosion-resistant materials and assembly methods must be used, including isolation of dissimilar metals against galvanic interaction. Resistance to corrosion

- must be achieved by the use of the appropriate base materials and coatings resorted to only when specifically permitted by the specifications.
- C. Match and balance all system components to achieve compatibility of equipment for satisfactory operation and performance throughout the entire operating temperature and control range. Installation shall be in accordance with manufacturer's recommendations.
 - D. Provide all controls, wiring, piping, valves, tubing, accessories and other components necessary to make a complete operating system.
 - E. Provide emergency boiler shut off breakglass stations at all entries or exits from the boiler room.
 - F. Boilers shall be not less than the rating as shown, and the height shall fit the space available, leaving ample allowance for drawing tubes, smoke connections, piping, etc.
 - G. Comply with all codes and regulations as follows:
 - 1. Construct, install, test and certify all equipment in accordance with requirements of the 2014 NYC Construction Code and the recommendations of the equipment manufacturers.
 - 2. Construct and install boilers, safety devices, pressure vessels and all other components and accessories that fall within the scope of the ASME Boiler and Pressure Vessel Code to conform to the code and bear the code stamp.
 - 3. Construct and install fuel burning equipment and control devices to conform to the requirements of Factory Mutual, FIA.
 - 4. Combustion performance shall comply with local and state smoke and air pollution ordinances.
 - 5. Construct and install electrical items to conform to National Fire Protection Association, and National Electrical Code and NEMA Standards.
 - 6. Boiler and components shall comply with latest NY State Boiler Code.
 - 7. Boilers and burners shall have been approved by the New York City Department of Environmental Protection (Air Resources). They shall also have been approved by the Materials and Equipment Acceptance (MEA) Division of the Department of Buildings. The MEA approval number shall be indicated on the shop drawings.
 - H. Submit the following simultaneously for approval prior to shipment:
 - 1. A complete detailed set of construction and erection drawings for all equipment components, controls and accessories, settings and bases indicating dimensions, materials of construction and methods of assembly. Show size and location of all outlets, including those for test instruments, access and inspection openings.
 - 2. A diagram showing boiler loads on the foundation.
 - 3. Complete capacity and performance data at 130%, 100%, 75%, 50% and 25% of rated capacity.
 - 4. Square feet of heating surface measured on the flue gas side.
 - 5. Cubic feet of furnace volume.
 - 6. Cubic feet of water space.
 - 7. Square feet of evaporating surface.
 - 8. Pounds of water at normal water line.
 - 9. Pounds of water full.
 - 10. Number of passes.
 - 11. Type of burner.
 - 12. Type of mechanical draft.
 - 13. Draft fan capacity in cfm at 70°F.
 - 14. Horsepower of draft fan motor.
 - 15. Operating weight.
 - 16. Stack temperature expected.
 - 17. Range of firing equipment.
 - 18. Wiring diagrams.
 - I. Provide the following inspections:
 - 1. The boilers and pressure vessels shall be inspected at Contractor's expenses during construction and testing and the entire installation inspected after completion by an authorized agent of a recognized boiler inspection company approved by the City of New York and by the inspectors of the 2014 NYC Construction Code.

2. Deliver certified inspection reports, in duplicate, to the City of New York before shipment of equipment.
 3. Deliver certified field inspection reports, in duplicate, to the City of New York as they are completed.
- J. Provide hydrostatic test as follows:
1. Before shipment, test all components hydrostatically at the manufacturer's plant to a pressure of at least 12 times the maximum allowable working pressure and a minimum of 60 psig.
 2. After installation, test the boilers hydrostatically to at least 12 times the maximum allowable working pressure and a minimum of 60 psig for a minimum of 8 hours with no loss of pressure or evidence of leaks.
 3. If leaks develop, repair them in conformance with Recommended Rules for Repairs by Fusion Welding to Power Boilers and Unfired Pressure Vessels issued by the National Board of Boiler and Pressure Vessel Inspectors. Upon completion of repairs, repeat the test.

2.21 HIGH-EFFICIENCY GAS-FIRED BOILERS

- A. Provide, as indicated, factory-assembled and tested gas-fired boilers, of capacity and efficiency as scheduled and herein specified. The water containing section shall consist of two integrated heat exchangers constructed of "Fin Tube" design, with straight copper tubes having extruded integral fins spaced seven (7) fins per inch. These tubes shall be "rolled" securely into glass-lined, cast iron headers. There shall be no bolts, gaskets or "O" rings in the head configuration. Removable access plugs shall be provided on the heat exchanger headers for the purposes of inspection, cleaning or repair. Boiler drains shall be provided, having external access. The heat exchanger shall be mounted in a stress free jacket assembly in order to provide a "free floating design" able to withstand the effects of thermal shock. The boiler shall bear the ASME "H" stamp for 160 PSI working pressure and shall be National Board listed. The complete heat exchanger assembly shall carry a ten (10) year limited warranty against failure caused by defective workmanship or material.
- B. The boiler shall be equipped to accept return water temperatures as low as 50°F with specified minimum set point temperatures of auxiliary piping or reheat loops.
- C. The boiler shall be supplied with a circulating pump wired for intermittent operation. Installations shall require primary/secondary piping to reduce overall head loss in the heating system. Secondary circulators will operate intermittently to prevent radiant heat loss due to water circulation through boilers in the off mode.
- D. The combustion chamber shall be constructed of stainless steel and sealed for combustion employing a fully condensing power burner concept. The burner surface shall be constructed of high temperature aluminum/chromium alloy woven mesh and fire in a vertical plan within the combustion chamber. The burner shall employ a special perforated flame injection tube extending the entire length of the heat exchanger. A ten-year warranty from the boiler manufacturer must be provided. The burner must be capable of firing at both a complete blue flame with maximum gas and air inputs as well as firing infrared when gas and air are reduced. Burner must be capable of firing at 100% of rated output when supplied with 4 inches water column of inlet gas pressure, so as to maintain service under heavy demand conditions, no exceptions. The burner shall fire in a full 360-degree pattern resulting in uniform heat transfer upon every inch of heating surface. A viewing port shall be provided, permitting visual observation of burner operation.
- E. The hot water boiler shall use a combustion air blower to precisely control the fuel/air mixture for maximum efficiency. The all aluminum blower will be mounted on the burner and draw gas and air from a premixing chamber. Utilization of a variable frequency drive will enable the blower to infinitely vary its speed, therefore adjusting the volume of gas and air supplied for combustion. The boiler shall operate between 25 percent and 100 percent of rated output. The combustion air blower shall operate for a pre-purge period before burner ignition and a post-purge period after burner operation to clear the combustion chamber.
- F. The boiler shall be constructed with a 16 gauge galvanized steel jacket assembly. The interior of the combustion chamber and flue collector shall be constructed completely of stainless steel so as to ensure corrosion protection. All inner and outer jacket panels shall be fully gasketed and sealed. The

exterior of the jacket assembly shall be primed and pre-painted on both sides with a minimum dry film thickness of 0.70 mils. All models shall be certified for installation on combustible floors without additional safety provisions.

- G. The boiler shall be designed to allow field installation of multiple venting options. The boiler shall be vented with a vertical Direct Vent system using a two pipe system constructed of Category IV vent pipe material, vent and air intake caps supplied by mechanical contractor.
- H. The boiler shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard for the US and Canada. The boiler shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard. The boiler shall operate at up to 97% thermal efficiency.
- I. Standard operating controls shall include an adjustable immersion type, digital temperature controller and an immersion safety, adjustable manual reset high limit to regulate boiler water temperatures. Multiple air pressure switches shall be provided to provide operation of the combustion air fan, monitor combustion chamber pressures and monitor operation of the flue.
- J. The standard control system shall include an electronically proven Hot Surface Ignition system with full flame monitoring capability. Additional standard controls shall include a low voltage transformer for the control circuit, a flow switch to prove water flow, inlet and outlet temperature displays, and a factory installed ASME pressure relief valve. The manufacturer shall verify proper operation of the burners, all controls and the heat exchanger by connection to gas, water and venting for a full factory fire test prior to shipping. A quality test report shall be shipped with each unit.
- K. The units control panel shall contain a lighted on/off main power switch, alarm light and audible switch, and a high temperature alarm light. A central monitor for all boilers shall be provided. This monitor will provide a digital display of 21 data points on each unit and be capable of monitoring up to 16 individual units. Displayed data points include temperatures, unit operation status, outdoor air reset programming, operational sensor location, total run time, sequencing operation - optional, and firing rate. A 24 VAC control circuit and components shall be used in conjunction with a 24-volt circuit breaker. All components shall be easily accessed and serviceable from the front and top of the unit. All wiring harness connections shall have multi-pin plug in type connectors to ease service, troubleshooting and reduce removal and replacement cost.
- L. The boiler shall be capable of two-way communication on a LonWorks building management network. The boiler shall be provided with a terminal strip for easy communication wiring. Remote diagnostic and operation information utilizing a personal computer shall be provided via phone line, modem and translation hardware package, provided by boiler manufacturers, temperatures, unit operations status, outdoor air reset programming, operational sensor location, total run time, sequencing operation, and firing rate shall be visible using the remote connection, adjustment of changeable points is required. Monitoring only is unacceptable.
- M. The multiple boiler plant shall be sequenced using an efficiency optimization arrangement. A two-wire connection between each boiler and the sequencer in a "daisy chain" arrangement will provide all necessary wiring (wiring performed by mechanical contractor).
- N. Efficiency Optimization will energize boilers and control firing rate to maximize the efficiency of the entire boiler plant. The sequencing control will first determine building heat load. Then it will calculate the optimum available firing rate based on the number of boilers available for operation. Finally the control will energize the selected number of boilers and fix their firing rate to match system demand while maximizing efficiency.
- O. The hot water boiler shall have an independent laboratory rating for Oxides of Nitrogen (NOx) of less than 20 ppm corrected to 3% O₂.
- P. Boilers shall be provided with remote control panel, Model SMP3006 or approved equal.
- Q. Boilers shall be provided with a condensate neutralization system.
- R. The Firing Control System shall be infinitely proportional hot surface ignition with electronic supervision.

- S. Boilers shall be manufactured by Burnham, Lochinvar, Weil-McLain or approved equal. Substitute manufacturer's will be considered only if equipment efficiency ratings meet or exceed those ratings as scheduled on drawings.

2.22 VARIABLE FREQUENCY DRIVE

- A. SEE SECTION 23 0513 FOR DRIVE SPEC

2.23 NEDERMAN EXHAUST SYSTEM

- A. The function of the vehicle exhaust removal system will be to source capture 100% of the exhaust emissions directly at the tail pipe of the vehicle and exhaust those emissions to a specified area safely outside the building.
- B. The exhaust system must not interfere with access to the vehicle, nor impede doorways/walkways/or exits that would endanger the welfare of fire personnel. Drooping loops of hose or the hose assembly touching the floor will not be permitted.
- C. As safety to personnel is of the utmost importance, the system shall be so designed as not to whip or fly back into quarters upon disconnection. Vehicles shall be capable of exiting quarters at normal speed without causing damage to the system or taking any portion of the hose or nozzle assembly along with the exiting vehicle.
- D. The fan shall automatically start prior to vehicle ignition.
- E. The exhaust system must move with the vehicle in a forward or reverse direction of travel and have an automatic release design without any positive locking device or air bladder that clamps or binds to the tail pipe. No system that uses the vehicles tailpipe, as a pulling force will be considered.
- F. The exhaust system shall utilize a minimum 6.2" diameter hose in order to insure that the exhaust system can accommodate vehicle apparatus checks; and not limited to just emergency departures. Any smaller hose does not offer the required cross sectional area considered adequate for the volume of hot exhaust fumes discharged during extended run times required during routine vehicle check procedures.
- G. Each submittal must be accompanied by a set of detailed specifications, which describe the proposed System and equipment in the same sequence as this advertised specification for ease of comparison.
- H. The exhaust system shall attach directly to the tail pipe. A general room ventilation method or ceiling-mounted air cleaner shall not be accepted. Only a source capture system protects the firefighter from harmful diesel fumes.
- I. SYSTEM OPERATION

The auto-disconnect exhaust system shall be a 24-volt electromagnetic release type that captures 100% of the exhaust emissions directly from the tail pipe and discharges those emissions to a specific location by means of an exhaust fan. Upon emergency dispatch of the vehicle, the exhaust fan shall automatically start prior to the engine being energized. The exhaust fan shall remain in the "on" position for as long as any engine is running. Upon vehicle exit, the hose assembly remains connected to the tail pipe and automatically disconnects at a specified distance outside the door by de-energizing the electromagnet. The nozzle and hose assembly shall smoothly separate from the vehicle and safely retract to the stored position ready to connect to the vehicle upon reentry. Upon disconnection, the hose assembly shall not be permitted to swing wide or touch the floor, possibly endangering personnel or apparatus. The hose shall remain at the door, ready for reconnection. Once the apparatus has left the building, the fan will automatically shut down after a preset time interval.

- J. Upon return, the fan is automatically activated prior to vehicle entry and the nozzle is connected to the tail pipe in a standing position. Bending over to connect the exhaust system and expose the operator to harmful exhaust fumes is not permitted. No positive locking device or moving parts shall be permitted to be connected to the tail pipe. After the vehicle has been turned off, the fan can continues to operate for a preset time interval, normally two minutes.

K. SCOPE OF WORK

1. A licensed Contractor shall furnish and install a Source Capture Emergency Vehicle Exhaust Extraction System as designed and specified for the station(s).
2. The Contractor shall provide and install a centrifugal exhaust fan with capacity for all connected vehicles.
3. The Contractor shall provide and install an automatic fan start control console. The control console and all internal components shall be UL listed and manufactured in accordance with UL standard 508A and bear the UL label.
4. The Contractor shall provide and install all ductwork.
5. The Contractor shall be responsible for the delivery, safe storage, and handling of the products and protect them from weather elements.

L. SUBMITTALS AND CODES

The following submittals and code compliance shall be required:

1. Record building dimensions, note vehicle type and prepare shop drawings that include: equipment position, dimensions, sizes, weights, performance data, and also location and size of field connections.
2. Product Data: Provide manufacturer's literature and data sheets indicating rating capacities, dimensions, weights, accessories, and electrical requirements, wiring diagrams, location and size of field connections.
3. Provide fan curves with specified operating point clearly plotted.
4. Submit fan sound level data for fan specified.
5. Manufacturer's Installation, Operation and Maintenance Manual, which outlines the procedures required for system installation, start up, operation and shut down. The instructions shall include the manufacturer's name, telephone number, model number, service manual number, parts list, and brief description of all equipment and the basic operating features. The maintenance instructions shall list routine maintenance procedures, and troubleshooting guide.
6. Certifications: International Quality System Standard ISO 9001 and ISO 14001 Certified. ISO 9001 and ISO 14001 certificate shall be submitted at bid time UL Certification: UL listing, 508A Industrial Control Panel bulletin. Compliance with: NFPA 1500, 2003 International Mechanical Code, NIOSH CIB #50, OSHA 2001 American Conference of Governmental Industrial Hygienists (ACGIH) 2002 Proposed Regulations for Benzene and Diesel Exhaust Fumes, Federal Communications Commission approvals.
7. Compliance with all State and Local mechanical, electrical and building codes: Uniform Mechanical Code (UMC), American Society of Manufacturing Engineers (ASME), National Electric Code (NEC), Uniform Building Code (UBC), American Institute of Steel Construction (AISC), Sheet Metal and Air Conditioning Contractors National Association (SMACNA), American Society of Testing Materials (ASTM).

M. SUCTION RAIL ASSEMBLY

The Suction Rail shall be a polished aluminum extrusion that is formed in a configuration such that the extrusion serves not only as a suction duct, but also as the guide rail that the extraction trolley travels in. The wall thickness of the aluminum extrusion shall be no less than .09375". The weight of the aluminum extrusion is 4.6 lbs. per lineal foot. The area of the aluminum extrusion, in a cross-sectional view, shall have the minimum equivalent area of .2035 sq. ft. with an overall length as specified and indicated on the drawings. Each open end of the suction rail shall be covered with an end cap that can also be used as a round duct outlet for 8" diameter exhaust duct. As an alternate outlet, one or more rectangular-to-round transitions can be mounted on the topside of the suction rail after the cutout has been made per the manufacturer's specified size. A pair of EPDM rubber seals is installed at the bottom of the extrusion opening. The rubber seals have a Teflon strip on the inside surface which enables the trolley to travel smoothly and unhindered. The rubber seals close tightly during fan operation for an airtight seal, but open evenly around the trolley during trolley travel. The suction rail shall be supplied with internal rubber bumpers installed at both ends that serve as secondary stops to the trolley. The suction rail shall be supplied with suspension attachments that are specifically designed for fastening to the configuration of the suction rail. Spacing of the suspension attachments shall not exceed 16 feet center-to-center.

N. EXTRACTION TROLLEY ASSEMBLY

The Extraction Trolley Assembly serves as the component in the Rail System that travels in the suction rail, carries and supports the vertical hose assembly, balancer, current collectors, shock absorber and trolley stop mechanism. The Extraction Trolley body shall be made of light weight composite with a low friction surface on each side to enable the trolley to travel smooth through the rubber seal. Also, on a formed bracket mounted to the composite body, shall be a Disconnection box, acting as a circuit breaker for the Electro Magnet.

O. BALANCER

Integrated to the Extraction Trolley Assembly is a Balancer. The adjustable tension Balancer shall retract the hose and nozzle away from the vehicle as it leaves the building and safely suspend the assembly off the floor in the storage position when not in use. The Balancer shall have a spring characteristics that ensure that the cord is wound onto the drum at a safe and constant speed.

P. VERTICAL HOSE

The Upper Vertical Suction Hose shall be 6.2" in diameter, and of suitable flexibility to have a compression ratio of minimum 8:1. The hose material shall be Trevira fabric covered with HYPALON (CSM, Chloro-sulfonated polyethylene). The hose shall be fire resistant according to DIN 4102 B1. The lower hose shall be designed to withstand a 500oF engine temperature in conjunction with induced ambient air for cooling. The hose shall be capable of withstanding temperatures of 340 degrees Fahrenheit continuously, up to 370 degrees Fahrenheit on an intermittent usage basis. (NOTE: If a 'closed type sealed system' is being used, the temperature ratings must be 680°F and 740°F respectively.) (Exhaust hoses that are laminated neoprene-coated polypropylene fabric with wire helix structure shall not be accepted.) The helix shall be external and made of aluminum. The helix shall have high flexibility and the fabric able to withstand oil, chemical, ozone and weather resistance.

Q. NOZZLE

1. The Nozzle shall be a minimum of 8" diameter and designed to capture 100% of the vehicle exhaust fumes generated at the vehicle tail pipe and is held in place by spring tension in conjunction with the electromagnet connection. The nozzle permits an ambient air mix in the air stream to immediately reduce exhaust emission temperatures up to 50% at the point of capture. The reduced air stream temperatures prolong component life by not permitting thermal breakdown of materials. The Nozzle shall be designed so as not to cause or create back pressure on any vehicle engine, nor draw raw diesel- or gasoline fumes into the exhaust hose while connected to a non-operating vehicle, nor create the possibility of spinning a non-lubricated turbo which could result in bearing failure.
2. In a 'closed type sealed system', a pressurized container is created presenting an explosive potential when drawing raw fumes from a non-operating vehicle and all system electrical components must be of explosion proof design. No closed system will be considered. These conditions are non-existent with an ambient air mix nozzle design.
3. The operator never has to touch the Nozzle for connection, but can position the Nozzle over the tail pipe while the operator grips the hose handle and simultaneously connects the electromagnet to the anchor plate. Tension will be automatically applied to the Nozzle created by an internal leaf spring assembly, which holds the Nozzle firmly in place over the tail pipe. The positioning of the electromagnet on the vehicle, combined with the tension created at the Nozzle, shall not allow the Nozzle to come away from the tail pipe until the electromagnet is either automatically or manually de-energized. The Nozzle shall be constructed of both metal and rubber, with no internal movable parts related to the connection of the Nozzle to the tail pipe. The Nozzle Hose shall be a minimum of 6.2" in diameter. The hose material shall be lightweight coated fiberglass with a smooth bore. The galvanized steel helix shall be completely rubber covered. The inlet diameter at the Nozzle is oversized to allow maximum airflow capacity for large engines and/or pump tests. The inlet boot of the Nozzle is to be made of EPDM rubber, and bonded to a sturdy 24 gauge steel conical reducer.
4. The design of the nozzle shall allow for maximum flexibility to accept a variety of tail pipe configurations, which typically terminate at 90° to the side of the vehicle. Tail pipe adapters are not permitted nor required. No positive locking devices or a concept of a positive locking device, pneumatics, internal or external air hoses, wires, airbags, valves or precautionary devices for pneumatic bursting pressure shall be permitted or allowed.

R. ELECTROMAGNET ASSEMBLY

1. An electromagnet shall be used as the means of keeping the nozzle and hose assembly attached to the vehicle, whether at rest or as it moves to the point of exit. The electromagnet shall be 24 volts, DC with power supplied via an insulated conductor encapsulated within the helix of the upper hose. The electromagnet assembly shall consist of a nitro carburized electromagnet disc, a manual override switch, and an anchor plate. The electromagnet disc assembly shall be slightly recessed to serve as a guide for ease of connection to the anchor plate mounted on the vehicle and serve as the energized contact point. The formed collar shall be of a smooth and rounded configuration to prevent hooking or catching on external devices of the vehicle.
2. A manual override switch shall be easily accessible to disconnect the hose assembly while accessing storage compartments or performing vehicle maintenance. The manual override switch shall be conveniently mounted facing the operator. The purpose of the switch shall be to manually de-energize the electromagnet, allowing the hose and nozzle assembly to come away unrestrained from the vehicle when in the parked position within the building. The 24-volt UL switch shall be surrounded and mounted in a closed cell water resistant neoprene jacket.
3. The Anchor Plate shall be mounted on the vehicle to allow the operator, in an upright position, to connect the electromagnet. The Anchor Plate shall have an outer circular isolated holder made of hard resilient plastic. Recessed in the center of the holder shall be a finished, Nedox treated steel disc to receive the electromagnet. The Anchor Plate shall be positioned on the vehicle in relation to the vertical and horizontal centerlines of the tail pipe outlet.

S. DISCONNECTION SWITCH

Affixed to the Rail near the exit door, shall be a permanent magnet, which in conjunction with the disconnection box causes a 24-volt electromagnet to disconnect the hose assembly from the vehicle. The separation of the entire hose assembly from the vehicle is a one step process whereby no stress or strain is transferred from the vehicle to the exhaust hose or overhead brackets. Numerous mechanical functions to achieve nozzle separation such as valve activation, pneumatic deflation, and pulling forces to remove the nozzle from the tail pipe are not permitted. The disconnection switch shall be adjustable to create a nozzle release point at a specified distance as the vehicle exits the building. If a proper disconnect does not occur, the electromagnet has a built-in safety disconnection feature, which releases it with a 50-pound shear force. Then the hose and nozzle assembly remains intact. With other systems utilizing a mechanical or pneumatic direct connection to the tail pipe, a breakaway system is required to prevent the entire hose assembly from leaving the building with the vehicle.

T. END STOP

The Rail shall be equipped with an End Stop, one for each Trolley, which is designed to stop the travel of the entire hose, nozzle, and balancer assembly. The stopping action itself must be spring cushioned to prevent the assembly from coming to an abrupt and immediate halt at an exit speed of up to 15 mph. The End Stop consists of a coiled spring hydraulic oil damper, which is located in the front end of the each Suction unit.

U. FAN AUTO-START

The Fan Auto-Start serves to act as a remote control for fan start up to ensure the exhaust system is always running whenever an emergency vehicle is in operation. Upon dispatch, the exhaust fan shall automatically start and be running at full rpm prior to engine start up via a radio frequency transmitter mounted within the vehicle. The fan stays on as long as any vehicle is in operation. Upon vehicle exit or shut down, a variable timer then activates and the fan automatically turns off after a variable timed cycle. Upon vehicle return, the transmitter shall automatically activate the exhaust fan prior to the vehicle entering the building. The fan remains in operation until all vehicles are turned off and the timer then activates. The Control unit shall be FCC-approved and shall not interfere with radio communications garage doors or on board computers.

V. CENTRIFUGAL FANS

- a. The fan shall be a direct drive centrifugal type, high pressure, single width, single inlet as required or indicated. Impeller wheels shall be of a modified radial tip design, with top forward curve and airfoil thickness configuration characteristics. Impeller wheels shall be spark resistant and made of aluminum to prevent static electricity build up. The impeller shall be dynamically and static balanced, and of the non-overloading type to provide maximum efficiency while achieving quiet, vibrations free operation. The fan housing shall be manufactured from cast aluminum. The fan and motor assembly shall be mounted on a galvanized steel frame, which shall protect the motor, while also serving as a mounting platform for field installation.
- b. For fans 5 HP and larger, centrifugal fans shall be fully enclosed, single-width, single-inlet steel construction as required or indicated. Impeller wheels shall have backward inclined or backward curved blades of the non-overloading type. The bearings shall be self-aligned ball bearing type permanently sealed and lubricated. Fan shafts shall be steel and rotate in a non-sparking aluminum rubbing ring. Fans shall be accurately finished, and shall be provided with key and key seats for impeller hubs and fan pulleys. The fans shall be furnished with factory finish protective weather coating and a drain kit. The motor shall be totally enclosed fan cooled (TEFC). Motor starters shall be magnetic with general-purpose enclosures. The fan shall be structurally supported and provided with vibration isolators as specified to ensure quiet and smooth operation. The exhaust discharge outlet shall be in compliance with ACGIH recommendations and EPA requirements. Air intakes, windows, cascade systems, prevailing currents, communications equipment and building aesthetics will be considered in the final location of the fan. Exhaust filtration systems will be provided upon request and silencers will be provided when needed. All fans are tested in accordance with AMCA Standards in an AMCA approved test facility.

W. AIR FLOW PERFORMANCE

Fan capacity shall be sized as such as to deliver a minimum of 700 cfm (or as otherwise specified) at each hose drop to the vehicle being served. The exhaust system shall pull exhaust into the nozzle also inducing ambient air. The system shall be designed entirely for a negative pressure vacuum method of exhaust extraction. At no point in exhaust system will ducting be under positive pressure. Exhaust system hose drops shall be sized to maintain equal or larger cross sectional diameters than vehicle tailpipe. Exhaust systems, which do not size hose drops in accord with the vehicle engine capacity, as well as vehicle tailpipe diameter, shall not be accepted. The purpose of this portion of the specification is to insure that the exhaust system is designed to cool down exhaust as they are conveyed to the outside of fire station. This type of exhaust extraction keeps exhaust temperatures well below their designed temperature tolerances. This also prevents thermal break down of hose material thus adding years to system life. Exhaust systems that size exhaust drops without dilution ventilation and also down size the exhaust connection hose, unnecessarily put the vehicle engine warranty at risk. The delivered volume shall take into account all lengths of ductwork, elbows, and branches, shut off, wyes, etc., which accumulate the static pressure at the fan inlet. Manufacturer provided fans shall be performance guaranteed.

X. DUCT SYSTEM

1. Duct work - Ducts, unless otherwise specified or approved, shall be round and conform to the dimensions as shown on the drawings. Ducts shall be straight and smooth on the inside with airtight joints. Wherever ducts are used with crimped ends, the joint shall have crimp and bead arrangement. The bead shall provide a rigid stop for the mating open end to seat. Ducts shall be constructed of galvanized steel and sealed in accordance with standard SMACNA methods, for the system designed negative pressure in inches w.g. All duct joints to sealed and air tight.
2. Duct fittings - Reducing fittings shall have a minimum of 1" graduating increase in diameter per 8" in length. Elbows up to 12" in diameter shall have a centerline radius of not less than 1.5 times the diameter. Elbows beyond 12" in diameter shall have a centerline radius of not less than 2.5 times the diameter. Branches shall enter the mains at a specified angle of not less than 30° with the centerline of the main duct in the direction of airflow, unless otherwise indicated or approved. Flexible connections to the main or branch duct shall be braced with approved metal straps or members.
3. Connections - Where duct of dissimilar metals are connected, or where sheet metal connections are made to fan inlet and outlet, only an approved fireproof flexible connection shall be used. The connection shall be installed and securely fastened by zinc coated steel clinch type draw bands for round ducts.

4. Framed Openings And Duct Sleeves - Duct sleeves shall be provided for all round ducts $\leq 15"$ diameter that pass through floors, walls, ceilings, or roofs. Sleeves in non-load bearing walls shall be fabricated of 20-gauge steel conforming to ASTM A 525. Sleeves in load bearing walls shall be fabricated of standard weight galvanized steel pipe conforming to ASTM A 53. Collars for round ducts $\leq 15"$ shall be fabricated from 20 gauge galvanized steel. Round ducts $> 15"$ in diameter passing through floors, walls, ceilings, or roofs shall be installed through framed openings. Structural steel members for framed openings shall conform to ASTM A 36. Framed openings shall provide a 1" clearance between the duct and the opening. A closure collar of galvanized steel $\geq 4"$ wide shall be provided on each side of the walls or floors where sleeves or framed openings are provided.
5. Stackhead - The exhaust discharge stack head will be a no loss type as recommended by ACGIH or as otherwise specified. The stack head design will protect against weather elements or introduction of debris.
6. Duct Test Holes - Test holes with covers shall be provided where indicated or directed, in the duct and plenum to insert Pitot tubes to take air measurements for balancing the air moving system if required.

Y. INSTALLATION

1. Exhaust System - The exhaust removal system shall be installed as indicated and recommended by the manufacturer. Welding and brazing shall conform to ASME-17. Slip joints shall be sealed. Riser duct shall be supported to the structure as indicated on the drawings. Main duct shall be attached to building structural members.
2. Building Surface Penetrations - All penetrations shall be sealed. Sleeves or framed openings shall be utilized where duct penetrates building surfaces. The space between the sleeve or framed opening and the duct shall be packed with mineral wool or approved material. Closure collars shall be installed around the duct on both sides of the penetrated surface. Collars shall fit tight against the building surfaces and snug around the duct.
3. Guide Track
Installation height of Guide Track shall be between 10' to 16' range or as otherwise indicated on the drawings. The Guide Track shall be installed approximately 14" from the side of the vehicle and $\geq 12"$ away from the side edge of the exit door. The Guide Track for the exhaust system shall include corrosion resistant brackets for ease of mounting to structural channel, trusses, or angle iron. Brackets shall be a minimum of 0.125" thickness. Mounting bolts to be no less than 0.375" diameter (structural grade 8) for connection to steel frame. Bolts required for masonry installation shall be 0.5" x 3.5" expansion bolts, or 0.375" x 4" sleeve anchors for wall mount masonry connection.
Recommendation: Unistrut 1 5/8" or Angle Iron 2"x 2"x 3/16".

Z. TESTS

Each exhaust system and inlet shall be balanced to produce the indicated air quantities within 10 percent at the conditions shown. Any fans with bearings shall be lubricated, and the speed, direction and rotation of each fan shall be checked and verified as running correctly. The running current of each motor shall be checked and verified as correct. Upon completion and prior acceptance of the installation, the exhaust system shall be tested at the operating conditions to demonstrate satisfactory functional and operating efficiency. The Contractor shall provide all instruments, facilities, and labor required to properly conduct the tests.

1. Instruction
The Contractor, or authorized approved personnel, shall provide instruction to the City of New York (or appointed representative) in the daily use of and maintenance of the vehicle exhaust removal system installed and specified herein.
2. Quality Assurance
All workmanship, manufacturing procedures, airflow design, and materials shall be tested and performance guaranteed.
3. Equipment Warranty
The Manufacturer shall guarantee all materials, equipment, and workmanship for a period of one (1) year from date of final acceptance of the complete job, against original defects of material and workmanship, or excessive wear or deterioration.
4. The Tail Pipe Exhaust System

Shall be the Magnarail system as manufactured by Nederman.

2.24 VARIABLE REFRIGERANT FLOW (VRF) SYSTEM

A. SYSTEM DESCRIPTION

Variable Refrigerant Flow (VRF) HVAC system shall be a variable capacity, direct expansion (DX) heat recovery engineered system. The water cooled condensing unit shall consist of one or more cabinet(s) connected through common refrigerant piping. Each system shall have single or multiple, inverter compressor(s). Each system shall be connected to multiple indoor units (ducted, non-ducted or combination thereof) through a common refrigerant piping and integrated system controls. Each indoor unit shall be controlled individually. Additionally heat recovery system shall be capable of simultaneous heating and cooling individual zone(s).

1. Simultaneous Cooling and Heating VRF System

The heat recovery system shall be an water cooled, system consisting of one to three condensing unit(s) connected to Heat Recovery (HRU) unit(s) and indoor unit(s). Multi-port heat recovery units shall allow simultaneous heating and cooling of individual zone(s).

The heat recovery system shall be capable of operating with 208/230V, 60Hz, 3 phase power.

B. CONDENSING UNITS

1. General

- a. The air-conditioning system shall use R410A refrigerant.
- b. Each system shall have one, two or three water source units.
- c. Dual and triple frame configurations shall be field piped together using manufacturer's designed and supplied Y-branch kit and field provided interconnecting pipe to form a common refrigerant circuit.
- d. Refrigerant circuit configuration for Heat Recovery System.
 1. The refrigerant circuit shall be constructed using field provided copper piped together with manufacturer supplied Heat Recovery unit(s) and Y- branches or Header fittings connected to multiple (ducted, non-ducted or combination thereof) indoor units to effectively and efficiently control the simultaneous heating and cooling operation of the VRF system.
 2. Each refrigerant pipe, y-branch, header kit, elbows and valves shall be individually insulated with no air gaps. All joints shall be glued and sealed.
- e. Factory installed microprocessor controls in the condensing unit(s), HR unit(s), and indoor unit(s) shall perform functions to efficiently operate the VRF system and communicate in a daisy chain configuration between condensing unit and HR unit(s) and indoor unit(s) via RS485.
- f. The system shall be designed to accept connection up to 58 indoor units.
- g. The system shall be capable of performing continuous operation when an individual indoor unit is being serviced or power to indoor unit is disconnected.
- h. The maximum allowable system combination ratio shall be 130%. Systems designed with combination ratio above 130% are not acceptable.
- i. The total nominal capacity of all indoor units shall be no less than 50% and no more than 130% of condensing unit's nominal capacity to ensure the VRF system will have sufficient capacity to meet the building's cooling and heating load at design day weather conditions.
- j. The condensing unit shall have a fusible plug.
- k. The fusible plug shall have a threaded connector.
- l. The unit shall be shipped from the factory fully assembled including internal refrigerant piping, compressor, contacts, relay(s), power and communications wiring necessary.
- m. Each condensing unit refrigeration circuit shall have the following components:
 1. Refrigerant strainer(s)
 2. Check valve(s)
 3. Oil separator

4. Accumulator
5. 4-way reversing valve
6. Vapor injection valve
7. Variable path valve
8. Oil balancing valve for Hi-POR (Available for 12 & 14 ton only)
9. Oil Level sensor
10. Electronic expansion valve(s)
11. Sub-cooler
12. High and low side Schrader valve service ports with caps.
13. Service valves
- n. Condensing Unit shall be capable at the following operating ambient air conditions.
 1. Heat Recovery System
 - a. Cooling: 14°F DB to 122°F DB
 - b. Heating: -13°F WB to 61°F WB
 - c. Cooling based synchronous: 14°F DB to 81°F DB
 - d. Heating-based synchronous: 14°F WB to 61°F WB
 - o. Refrigerant Pipe System Design Parameters
 1. The condensing unit shall be capable of operating at an elevation difference of up to 360 feet above or below the lowest or highest indoor unit respectively.
 2. The condensing unit shall be capable of operating with up to 3280 equivalent length feet of interconnecting liquid line refrigerant pipe in the network.
 3. The condensing unit shall be capable of operating with up to 656 actual feet or 738 equivalent length feet of liquid line refrigerant pipe spanning between condensing unit and farthest indoor unit.
 - p. Defrost Operations
 1. The condensing unit(s) shall be capable of auto defrost operation to melt accumulated frost off the condensing unit heat exchanger. The defrost cycle control shall be based on condensing ambient temperatures and condensing unit heat exchanger temperatures.
 - a. Continuous heating defrost
 2. During first two defrost cycles the unit shall allow heating mode indoor unit fans to stay "on" in low speed continuing to heat.
 - a. Complete defrost
 3. The third defrost cycle shall switch all condensing units to defrost mode to fully melt and clear frost, snow or ice accumulations off the condensing coil while turning "off" heating mode indoor unit fans to maintain efficient performance.
 - q. Oil Management
 1. The system shall have Hi-POR (High Pressure Oil Return) to ensure a consistent film of oil on all moving compressor parts at low speed. Oil is returned to compressor through a separate oil injection pipe.
 2. The system shall be provided with a centrifugal oil separator designed to extract oil from the oil/refrigerant gas stream leaving the compressor and return the extracted oil to the compressor oil sump.
 3. The system shall have an oil level sensor in the compressor to provide direct oil level sensing.
 4. The system shall only initiate an oil return cycle if the oil level is too low.
 - r. Cabinet
 1. Condensing unit cabinet shall be made of 20 gauge galvanized steel with an enamel finish.
 2. Condensing unit cabinet finish shall be tested in accordance with ASTM B-117

salt spray test procedure for a minimum of 1000 hours.

3. The front panels of the condensing units shall be removable type for access to internal components.
4. The cabinet shall have piping knockouts to allow refrigerant piping to be connected at the front or through the bottom of the unit.

s. Condensing Unit Coil

1. The condensing unit shall have a factory built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. The copper tubes shall have inner grooves.
3. The aluminum fins shall have factory applied corrosion resistant GoldFin™ material.
4. Coil coating shall be tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1000 hours
5. The condensing unit coil shall be tested to a pressure of 551 psig.
6. The coil for each cabinet shall have 14 Fins per Inch (FPI).
7. All the condensing units shall have a 3 rows heat exchanger.
8. The cabinet shall have a coil guard.

t. Compressor(s)

1. Each 6, 8, 10 ton cabinet shall be equipped with one hermetically sealed, inverter driven, High Side Shell (HSS) scroll compressor.
2. The 12 and 14 ton cabinet shall be equipped with two hermetically sealed, inverter driven, HSS controlled scroll compressors.
3. Each inverter driven, HSS scroll compressor shall be capable of operating in a frequency range from 15 Hz to 150 Hz with control in 0.5 Hz increments.
4. The compressor(s) shall be equipped with a 60 Watt crankcase heater.
5. The compressor shall use a factory charge of Polyvinyl Ether (PVE) oil.
6. The compressor bearing(s) shall have Teflon™ coating.
7. The compressor(s) shall be protected with:
 - a. High Pressure switch
 - b. Over-current /under current protection
 - c. Phase failure
 - d. Phase reversal

u. Sound Levels

1. Each cabinet shall be rated with a sound level not to exceed 59.5 dB(A) when tested in an anechoic chamber under ISO3745 standard.

v. Sensors

1. Each single cabinet shall have
 - a. Suction temperature sensor
 - b. Discharge temperature sensor
 - c. High Pressure sensor
 - d. Low Pressure sensor
 - e. Condensing temperature sensor
 - f. Condensing unit heat exchanger temperature sensor

C. Indoor units

1. The indoor unit shall be as scheduled. The unit shall have the capability to integrate into systems with various types of indoor units connected. The unit shall support individual control using DDC controllers. Units shall have the ability to control supplemental hot water heat via connector CN24 and a 12 vdc output.
2. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit

shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

3. The cabinet shall be pre-painted, pre-insulated, 22 gauge galvanized steel.
 4. Fan:
 - a. The indoor unit fan shall be an assembly with a single direct drive fan with a high efficiency dc motor.
 - b. The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
 - c. The indoor unit shall have a ducted air outlet system and ducted return air system.
 - d. The fan shall have 3-speeds with the capability to operate between 0.3-0.5 in.w.g. selectable.
 5. Filter:
 - a. Provide a filter rack and filter.
 6. Coil:
 - a. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - b. The tubing shall have inner grooves for high efficiency heat exchange.
 - c. All tube joints shall be brazed with phos-copper or silver alloy.
 - d. The coils shall be pressure tested at the factory.
 - e. A condensate pan and drain shall be provided under the coil.
 - f. The condensate shall be gravity drained from the fan coil.
 7. Electrical:
 - a. The unit electrical power shall be as scheduled.
- D. Controls
1. Provide an integrated control system for each VRF system including individual wall-mounted Remote Controllers for each fan coil units capable of being interconnected with each respective outdoor condensing unit.
 - a. Each apartment shall be provided with a central control system, similar the ACP Bacnet Gateway. The system shall have the following features:
 - 1 Standard Features:
 - a. Integrates Multi V and select Mini and Multi Split systems² with third party building management systems.
 - b. BTL certified (ASHRAE 135-2004) BACnet Application Specific Controller (B-ASC)
 - c. Supports registration as a foreign device
 - d. 20 x 4 character LCD
 - e. Indoor unit control/monitoring by groups/indoor units
 - f. Web access with user access control
 - g. Operation and error history log
 - h. Forced off digital input
 - i. Nine digital inputs and four digital outputs for device interlocking
 - 2 Basic Unit Functions
 - a. Operation – On/Off
 - b. Mode – Auto/Cool/Dry/Heat/Fan Only
 - c. Set point
 - d. Fan Speed – Auto/Low/Med/High/Power

e. Louver Swing

3 Advanced Unit Functions

- a. Two Setpoint Auto-changeover
- b. Two Setpoint Setback
- c. 200 Programmable Schedule Events with control of setpoint, On/Off Mode, Fan Speed, Controller Lock, and Louver Swing
- d. Temperature Setpoint Range Limit
- e. Remote Controller Lock (All, Setpoint, Mode, Fan Speed)
- f. Run Time Limit (Unoccupied Override)
- g. Software Device Interlocking
- h. Manual Control and Scheduling of Digital Output Kit
- i. Peak/Demand Control
- j. Visual Floorplan Navigation
- k. Error E-mail Notification

2. The controls network shall operate at 24vdc. Controller power and communications shall be via a common non-polar communications bus.

3. Wiring

- a. Control wiring shall be installed in a system daisy chain configuration from indoor unit to remote controller to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.
- b. Wiring shall be 2-conductor (16 awg), twisted shielded pair, stranded wire.

4. In the event that a new version of the central controller featuring a wireless interface becomes available prior to shipping to the site, the new model shall be provided at no additional cost.

- E. The System shall be manufactured by LG, Daikin AC, Toshiba or approved equal.

2.25 HEAT RECOVERY UNIT (HRU)

A. General:

- 1. HR unit shall be designed and manufactured by the same manufacturer of VRF indoor unit(s) and outdoor unit(s).
HR unit casing shall be made with galvanized steel.
- 2. HR unit shall require 208-230V/1-phase/60Hz power supply.
- 3. HR Unit shall be an intermediate refrigerant control device between the air source outdoor unit and the indoor units to control the systems simultaneous cooling and heating operation.
- 4. HR unit shall be engineered to work with a three pipe VRF system comprising of
 - a. High Pressure Vapor Pipe
 - b. Low Pressure Vapor Pipe
 - c. Liquid Pipe
- 5. HR unit shall be designed to be piped in series or parallel.
 - a. Each port shall be capable of operating in cooling or heating independently regardless of the operating mode of any other port on the HR unit or in the system.
 - b. HR unit shall be internally piped, wired, assembled and run tested at the factory.
 - c. HR unit shall be designed for installation in a conditioned environment.
 - d. HR unit shall have a liquid bypass valve.
 - e. HR unit shall have (2) two-position solenoid valves per port.
 - f. HR unit shall have a balancing valve to control the pressure between the high pressure and

- low pressure pipe during mode switching.
 - g. HR unit shall have an electronic expansion valve for subcooling.
 - h. HR unit shall not require a condensate drain.
 - i. HR unit shall be internally insulated.
 - j. All field refrigerant lines between outdoor unit and HR unit and from HR unit to indoor unit shall be field insulated.
 - k. The HR unit shall not exceed a net weight of 49 lbs.
6. Piping Capabilities
- a. The elevation differences for heat recovery systems shall be:
 - 1. Heat recovery unit (HRU) to connected indoor unit shall be 49 feet
 - 2. HRU to HRU shall be 49 feet
 - 3. Indoor unit to indoor unit connected to same HRU shall be 49 feet
 - 4. Indoor unit to indoor unit connected to separate parallel HRU's shall be 131 feet.
 - b. The acceptable elevation difference between two series connected HR units shall be 16 feet.
7. Controls
- a. HR unit(s) shall have factory installed unit mounted control boards and integral microprocessor to communicate with other devices in the VRF system.
 - b. HR unit shall communicate with the air source unit via the air source/indoor unit 2-conductor shielded communications cable terminated using a daisy chain configuration.
 - c. The VRF manufacturer shall provide published documentation that specifically allows the installation of field provided isolation valves on all pipes connected to the Heat Recovery unit to allow the servicing of HR units refrigerant circuit or the replacement of HR unit without evacuating the balance of the piping system.
 - d. Fan Coil Unit
 - 1. The indoor unit shall be a ducted fan coil design with a fixed bottom return, a fixed vertical discharge supply, and a modulating linear expansion device. The unit shall have the capability to integrate into systems with various types of indoor units connected. The unit shall support individual control using DDC controllers. Units shall have the ability to control supplemental hot water heat via connector CN24 and a 12 vdc output.
 - 2. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
 - 3. The cabinet shall be pre-painted, pre-insulated, 22 gauge galvanized steel.
 - 4. Fan:
 - a. The indoor unit fan shall be an assembly with a single direct drive fan with a high efficiency dc motor.
 - b. The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
 - c. The indoor unit shall have a ducted air outlet system and ducted return air system.
 - d. The fan shall have 3-speeds with the capability to operate between 0.3-0.5 in.w.g. selectable.
 - 5. Filter:
 - a. Provide a filter rack and filter.
 - 6. Coil:
 - a. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - b. The tubing shall have inner grooves for high efficiency heat exchange.
 - c. All tube joints shall be brazed with phos-copper or silver alloy.
 - d. The coils shall be pressure tested at the factory.
 - e. A condensate pan and drain shall be provided under the coil.

- f. The condensate shall be gravity drained from the fan coil.
- 8. Electrical:
 - a. The unit electrical power shall be as scheduled.
 - b. Controls
 - 1. Provide an integrated control system for each VRF system including individual wall-mounted Remote Controllers for each fan coil units capable of being interconnected with each respective outdoor condensing unit.
 - a. The manufacturer's unit controller shall be provided with a remote Button type temperature sensor.
 - b. Each apartment shall be provided with a central control system, similar the ACP Bacnet Gateway. The system shall have the following features:
 - 1. Standard Features
 - 2. Integrates Multi V and select Mini and Multi Split systems with thirdparty building management systems.
 - 3. BTL certified (ASHRAE 135 - 2004) BACnet Application Specific Controller (BASC)
 - 4. Supports registration as a foreign device
 - 5. 20 x 4 character LCD
 - 6. Indoor unit control/monitoring by groups/indoor units
 - 7. Web access with user access control
 - 8. Operation and error history log
 - 9. Forced off digital input
 - 10. Nine digital inputs and four digital outputs for device interlocking
 - 2. Basic Unit Functions
 - a. Operation – On/Off
 - b. Mode – Auto/Cool/Dry/Heat/Fan Only
 - c. Setpoint
 - d. Fan Speed – Auto/Low/Med/High/Power
 - e. Louver Swing
 - 3. Advanced Unit Functions
 - a. Two Setpoint Auto-changeover
 - b. Two Setpoint Setback
 - c. 200 Programmable Schedule Events with control of setpoint, On/Off Mode, Fan Speed, Controller Lock, and Louver Swing
 - d. Temperature Setpoint Range Limit
 - e. Remote Controller Lock (All, Setpoint, Mode, Fan Speed)
 - f. Run Time Limit (Unoccupied Override)
 - g. Software Device Interlocking
 - h. Manual Control and Scheduling of Digital Output Kit
 - i. Peak/Demand Control
 - j. Visual Floorplan Navigation
 - k. Error E-mail Notification
 - 4. The controls network shall operate at 24vdc. Controller power and communications shall be via a common non-polar communications bus.
 - 5. Wiring
 - a. Control wiring shall be installed in a system daisy chain configuration from indoor unit to remote controller to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.
 - b. Wiring shall be 2-conductor (16 awg), twisted shielded pair, stranded wire.
 - 6. In the event that a new version of the central controller featuring a wireless interface becomes available prior to shipping to the site, the new model shall be provided at no additional cost.
 - a. The System shall be manufactured by LG, Daikin AC, Fujitsu or approved equal.

PART 3.00 - EXECUTION

3.01 GENERAL REQUIREMENTS FOR ALL HVAC EQUIPMENT

- A. Examination
 - 1. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 2. Examine roughing-in for ductwork, piping, and electrical connections to verify actual locations before installation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Installation
 - 1. Secure all equipment to building structure and install equipment in accordance with approved detail drawings, manufacturer's instructions, and all codes and regulations which apply.
 - 2. Install all accessories not factory installed.
 - 3. Install equipment level and plumb unless otherwise noted.
 - 4. Install equipment with required access and clearances. If there are field condition that prevent providing access and clearances notify the COMMISSIONER. If the equipment is installed before rectifying the access and clearance issues the Contractor shall be require to remove and re-install the unit as required and make any associated changes to the associated ductwork, piping, wiring and controls at no cost to the City of New York.
 - 5. Where required suspend equipment from structure or mount on concrete base or stand with vibration isolators. Vibration isolators are specified under Section "Vibration Isolation and Seismic Restraints."
 - 6. Install sensors and controls supplied with the equipment and as called for under Sections related to Automatic Temperature Controls.
- C. Connections
 - 1. Piping and ductwork installation requirements are specified in other sections.
 - 2. Drawings indicate general arrangement of piping, ductwork, fittings, and specialties. Arrange connections as per approved shop drawings.
 - 3. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
 - 4. Install piping and ductwork adjacent to equipment to allow service and maintenance.
 - 5. Ground equipment.
 - 6. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
- D. Field Quality Control
 - 1. Testing: Perform the following field quality-control testing and report results in writing:
 - a. After electrical circuitry has been energized, start units to confirm proper motor.
 - b. Test and adjust controls and safeties
 - 2. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- E. Cleaning
 - 1. After installing units, inspect equipment for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
 - 2. After installing equipment, clean internally according to manufacturer's written instructions.
 - 3. Install new filters in air handling equipment within two weeks after start up.
 - 4. Basket strainers shall be initially cleaned two week after start-up with a second cleaning two weeks after that. If there is still excessive debris in the strainers the Contractor shall being the water treatment subcontractor back to re-flush the system.
- F. Start Up
 - 1. Verify that equipment is installed and connected according to approved shop drawings and contract drawing.
 - 2. Adjust flows and controls.

3. Test and adjust controls and safeties. replace damaged and malfunctioning controls and equipment.
- G. Factory Start Up Service
 1. Engage a factory-authorized service representative to perform startup service for the following equipment or as specified under Commissioning:
 - a. Make-up Heating and Ventilating Unit with Energy Recovery
 - b. Air cooled AC units
 - c. Water-cooled VRU units
 - d. Hood exhaust fans and make-up air fans
 - e. Boilers
 - f. VFDS
 2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
 3. Complete installation and startup checks according to manufacturer's written instructions.
 4. Prepare a written startup report that records results of tests and inspections.
- H. Demonstration and Instruction
 1. Engage a factory-authorized service representative to demonstrate the equipment's operation and to instruct the City of New York's maintenance personnel to adjust, operate, and maintain units as specified under Commissioning.

3.02 SEISMIC REQUIREMENTS

- A. Equipment shall be supported and properly braced in accordance with New York City Building Code section 1621 and ASCE 7, Section 9.6 as required by the New York City Building Code. Transverse and longitudinal bracing shall be provided as required per New York City Building Code section 1621 and ASCE 7, Section 9.6.
- B. Seismic plans and calculations shall be prepared and signed by a Professional Engineer with experience in seismic design.

END OF SECTION

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- D. If the system and its equipment are supplied by a manufacturer's distributor, as part of the submittal documentation, the manufacturer shall provide, on its corporate letterhead, a "letter of support". Said "letter of support" shall state that, when in the opinion of the Contracting Officer, the distributor's efforts require back-up and/or assistance, the manufacturer shall provide, at no cost to City of New York, all required technical support and manpower, in a timely manner, during the installation period and for a one (1) year guarantee period starting on the date of final acceptance by the City of New York. If said "letter of support" is not submitted, the manufacturer's equipment will be deemed unacceptable and shall be grounds for summary rejection of the submitted system equipment.
- E. Provide samples of various items when so requested.
- F. System Manual:
 - 1. Upon final approval of all submittal documentation and shop drawings by the commissioner and all Authorities having jurisdiction, the PV system provider shall compile and assemble, with the equipment manufacturer's assistance, a complete system manual consisting of: operating and maintenance instructions, manufacturer's catalog pages of all equipment and components, all as-built wiring and conduit diagrams (both floor plan and riser types) and a manufacturer's suggested spare parts list. The PV system provider shall provide one (1) copy to the commissioner for approval.
 - 2. Upon Commissioner's approval of the system manual, the PV system provider shall provide and turn over to the City of New York six (6) copies of the approved system manual.
- G. Any equipment substitution must address the system design criteria as follows:
 - 1. All components shall be U.L. listed or recognized to appropriate U.L. standards by a nationally recognized testing laboratory.
 - 2. Inverter output: 120 Volts, 60 Hz, Sine Wave: 1.8 Amperes each.
 - 3. Provide all A.C. disconnects as required by 2008 NEC Article 690 and as indicated on PV system single line diagrams.

PART 2.00 – PRODUCTS

2.01 PHOTOVOLTAIC MODULE (PVAC)

- A. Module shall be rated 300 Watts D.C. and 285 Watts A.C. at Standard Test Conditions of 1000 Watts per square meter at AM 1.5 G Solar spectrum radiation and a temperature of 25°C. Solar cells to be Monocrystalline silicone type and be certified to U.L. 1703.
- B. Module shall include integral inverter which produces 285 watts output at 208 volts AC based upon 300 watts input.
- C. Module shall be approximately 1640 mm by 1000 mm by 35 mm and weight 18kg.
- D. Module shall be U.L. 1741 listed.
- E. Provide module with extended warranty of 10 years.
- F. Module manufacturer shall furnish a pre-fabricated cable to interconnect modules and interconnect modules to PV disconnect switch.
- G. Inverter shall be integrated with and attached to PV module in place of junction box. No external D.C. conductors of any kind shall be permitted.
- H. Inverter shall not be required by U.L. 1741 or the NEC to incorporate DC-side ground fault detection circuitry.
- I. Inverter shall have internal 2A fuse.
- J. Module shall be Mono X ACE by LG or approved equal of Exceltech or Solar Works.

- C. Panelboards as specified in section 26 24 16.
- D. The PV system provider shall coordinate work in this Section with all related trades. Work and/or equipment provided in other Sections and related to the Photovoltaic system shall include, but not be limited to:
 - 1. Support system for PV modules.

1.07 QUALITY ASSURANCE

- A. It is the intent of these Specifications to provide a complete Photovoltaic system that complies in all respects with the requirements of all applicable codes and standards. Equipment, material, installation practices, etc. that do not meet these requirements or do not meet the performance standards herein specified shall not be acceptable.
- B. All Photovoltaic system equipment furnished under this Specification shall be certified as listed to the appropriate UL standards by an authorized nationally recognized testing laboratory.
- C. Numbers and types of devices or circuits shall be as shown on the Drawings and as herein described in this Section. Should any conflicts arise between and Drawings and/or this Section, regarding the quantities of devices or circuits, the higher quantity shall be considered as correct.

1.08 SUBMITTALS

- A. Prior to the start of work, the PV system provider shall provide a complete and comprehensive submittal for review and approval by the commissioner, NYC Bureau of Electrical Control, NYC Advisory Board and Con Edison describing the proposed system and its equipment.
- B. Submittals shall be provided within thirty (30) days of the award of the Contract.
- C. provide a complete submittal shall be grounds for summary rejection of any incomplete submittal documentation. The complete submittal shall include, but not be limited to, all of the following material:
 - 1. A list (bill of materials) of all types of equipment and components provided. Each type of system panel and equipment shall have its U.L. listing clearly indicated.
 - 2. Description of operation of the system.
 - 3. Manufacturer's printed product data, catalog pages and descriptions including all installation procedures and user manuals. Provide physical dimensions of all components. Provide additional data as required to ascertain compliance with specifications.
 - 4. Detailed interconnection Design Package that includes:
 - a. Electrical Schematic Drawings reflecting the complete design that can easily be interpreted and are of quality necessary for full installation. The drawings shall show all components, their connections, and relation to the facility at the PCC (Point of Common Coupling) with Con Edison.
 - b. A set of specifications for the equipment proposed for installation.
 - c. Drawing or catalog page showing actual dimensions, of the solar panels, integral inverter, ac disconnect switches and all mounting hardware.
 - d. Scaled installation drawings showing complete layout of solar panels and support system. Drawings shall include detailed instructions and methods for installing, mounting and securing solar panels, and all connections between solar panels.
 - 5. Address and telephone number of the manufacturer's local service facility and the name and phone number of an individual responsible for addressing technical questions regarding installation.
 - 6. Site Assessment.
 - 7. All calculations required to substantiate compliance with system design criteria.

- D. System shall include all mounting hardware, interconnecting cables, A.C. disconnect switches, all wiring shall be run in conduit.
- E. System shall comply with 2014 NEC, 690.12, Rapid shutdown by operation of PV system disconnect and/or operation of line side building service switch.
- F. System shall produce 900 Watts at 60 Hz AC at Standard Test Conditions of 1000 watts per square meter at an AM1.5G solar spectrum and a temperature of 25°C.

1.03 WORK INCLUDED

- A. The work covered by this Section of the Specifications shall include all design, labor, equipment, materials, hoisting, rigging and services necessary to furnish and install a complete solar electric roof system with all operations as herein described and as shown on Drawings. The system shall consist of, but not be limited to, the following:
 - 1. PV modules with integral inverters (PVAC modules).
 - 2. AC disconnect Switches with module performance monitoring.
 - 3. PVAC rack grounding system.
 - 4. Monitor KWH production for PV array.
 - 5. All AC wiring conduit, connectors, terminators, fittings, panelboard, etc. required for a fully operational system, interconnected with utility system.
 - 6. Code required signage.

1.04 APPLICABLE LISTINGS, CODES AND STANDARDS

- A. Except as modified by governing codes and by the Contract Drawings, comply with the applicable provisions and recommendations of the following:
 - 1. All equipment shall be listed for its intended use. Applicable listings include UL-1741, UL-1703, IEEE 1547, IEEE 929, FCC CFR part 15 class B, and surge rated to IEEE 62.41 class B.
 - 2. National Electrical Code -2008- Article 690, as modified by New York City.

1.05 RELATED DOCUMENTS

- A. Prior to the commencement of work, the PV system provider shall obtain all permits necessary for installation of the work. All permit costs and inspections fees shall be paid for by the Contractor.
- B. New York City and Utility Company requirements shall be adhered to with regard to submitting specifications, wiring diagrams, shop drawings and plans. Responsibility for furnishing the quantities of copies on cloth, paper, and/or ACAD computer drawing files as directed by such requirements, shall be included as part of the Work of this Section.
- C. Prior to commissioning and after completion of work, the PV system provider shall notify all authorities having jurisdictions for testing and inspection.
- D. The PV system provider shall submit a letter of approval of the installation, from utility before requesting final acceptance of the system.

1.06 RELATED WORK

- A. Supplemental General Requirements of Electrical Work as specified in Section 26 05 00.
- B. Basic materials and methods as specified in Section 26 05 19.

SECTION 26 9000 - MODULAR SOLAR PHOTOVOLTAIC SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.
- D. A complete fully engineered, UL approved modular solar electric system shall be provided by a company that has been engaged in the engineering, design and installation of photovoltaic systems and have a fully equipped service organization within the proximity of the installation. Said company shall henceforth be referred to as the PV system provider.
- E. The Contractor shall identify his proposed installation company and provide a list of projects, similar in size and scope to this project along with a contact name at the facility and telephone number, for approval prior or start of any work, ordering any equipment, preparing any shop drawing, or performing the site assessment for this project.
- F. This contractor shall have the selected installer perform all work on PV system, including a Site Assessment. Site Assessment shall be submitted prior to selecting final location for PV array. Site Assessment shall evaluate impact of shading, including inter row shading, using either: Pathfinder, Sun Eye, or ASSET. This contractor shall submit the results of the Site Assessment Survey to the Commissioner with a final recommended location on the project roof, along with the proposed array orientation and tilt angle to satisfy the design criteria. Site Assessment shall be submitted with shop drawings for PV modules and BOS components.
- G. This contractor shall include all costs associated with obtaining New York City approval for the Photovoltaic system, including PVAC cells, interconnect cables, disconnects and all related components. This contractor shall submit all information based upon proposed system components prior to installation. This contractor shall correct all work which prevents New York City approval from being issued and shall correct all defects noted by BEC. Provide detailed diagram of the system to New York City Bureau of Electrical Control per NEC Article 690, paragraph 690.1 as modified by New York City.

1.02 SYSTEM DESCRIPTION

- A. The Photovoltaic system shall consist of polycrystalline silicon cell, Photovoltaic models with integral inverter. Interconnect cables, PV disconnect switches and required groundings.
- B. System shall be designed for roof mounting at a fixed tilt angle of not less than 10 degrees.
- C. System shall be designed for grid tie operation on load side of utility meter.

4. Non-Rated, Drywall, Masonry or Tile: Milcor MS-Stainless Steel for walls (for critical areas)
(for wet areas)
 5. Non-Rated Plaster Construction: Milcor Style K for walls or ceilings (use Style AP from
Acoustic Plaster)
- B. Furnish color-coded buttons or tabs to indicate location of pullboxes, disconnect switches or other equipment located above removable type ceiling where access doors are not required.

PART 3.00 - EXECUTION

3.01 GENERAL

- A. Direct location and setting of access doors in hung ceilings, furred spaces, walls, etc., to provide access to concealed work items requiring maintenance and/or adjustment. Locate access doors on shop drawings and obtain approval of the A/E for the locations of such access doors prior to installation.
- B. Locate and group equipment requiring access doors so that access door locations are aesthetically acceptable. Prepare drawings of pullbox and disconnect switch locations indicating proposed access door locations for review by the A/E prior to installation of pullboxes, disconnect switches, etc.

END OF SECTION

SECTION 26 6000 - ACCESS DOORS IN GENERAL CONSTRUCTION

PART 1.00 – GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the electrical work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Furnish access doors for installation in general construction.
 - 2. Furnishing color-coded identification tabs to locate concealed equipment.

1.03 RELATED WORK

- A. The following items are specified elsewhere:
 - 1. Finish painting is included in this division as specified in Section 26 05 00, except as herein specified.
 - 2. Concrete work is included in this division as specified in Section 26 05 00.

1.04 SUBMITTALS

- A. Shop Drawings: Submit access door locations superimposed on pullbox layout and equipment layout shop drawings. Access door shop drawings including size and type.
- B. Product Data: Manufacturer's latest published data for materials equipment and installation.

PART 2.00 – PRODUCTS

2.01 GENERAL

- A. Furnish access doors of proper size for access to concealed equipment. Unless otherwise indicated, minimum size to be 12" x 12" in conformance with the following schedule:
 - 1. Rated Walls and Enclosures: Milcor fire-rated access door Style UFR for rated walls and ceilings
 - 2. Non-Rated Drywall: Milcor Style DW for drywall ceilings and walls
 - 3. Non-Rated Drywall, Masonry or Tile: Milcor Style M for walls

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- C. Prior to final inspection, re-lamp all fixtures which have failed lamps, or lamps where visible color shift has occurred, and leave all lighting fixtures, equipment, and accessories in good, uniform operating condition. The Contractor shall replace any burned-out lamp during the first 100 days after the completion of the Contract.

3.05 LUMINAIRE INSTALLATION

- A. General: Install luminaires at locations and heights as indicated, in accordance with the manufacturer's written instructions, applicable requirements of NFPA 70, ANSI C2 and with recognized industry practices to ensure that lighting installation fulfills requirements.
- B. Support: Fasten luminaires securely to indicated structural supports; and check to ensure that the required degree of freedom is provided to allow alignment or aiming of the fixtures for indicated light distribution.
- C. Condition: Clean luminaires of dirt and debris upon completion of installation. Do not damage finishes or lens or refractor surfaces.
- D. Grounding: Provide equipment grounding connections using branch circuit equipment and connected sufficiently tight to assure a permanent and effective ground.

END OF SECTION

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.
- V. Suspended Lighting Fixture Support:
 1. Pendants and Rods: Where longer than 48 inches (1200 mm), 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.
 4. Do not use grid ductwork or piping as support for pendant luminaires. Connect support wires or rods to building structure.
- W. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.
- X. Adjust aimable lighting fixtures to provide required light intensities.
- Y. Connect wiring according to Division 26 Section "Basic Materials and Methods."

3.02 ADJUST AND CLEAN

- A. Clean: Clean lighting fixtures of dirt and debris upon completion of installation.
- B. Protection: Protect installed fixtures from damage during remainder of construction period.

3.03 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. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- C. Tests: Upon completion of installation of lighting fixtures, and after building circuits have been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

3.04 AIMING AND ADJUSTMENT

- A. All adjustable lighting units shall be aimed, focused, locked, etc., by the Contractor under the supervision of the Commissioner. The Commissioner shall indicate the number of crews (foreman and apprentice) required. All aiming and adjusting shall be carried out after the entire installation is complete. All ladders, scaffolds, lift equipment, safety belts, flashlights, walkie-talkie equipment, etc. required shall be furnished by the Contractor at the direction of the Commissioner. As aiming and adjusting is completed, locking set screws and bolts and nuts shall be tightened securely.
- B. Night work: Where possible, units shall be focused during the normal working day. However, where daylight interferes with seeing, aiming shall be accomplished at night.

- I. Installation of fixture locations shall be in strict accordance with the intent of the contract drawings and approved shop, specifications and drawings.
- J. Fixture locations: Do not scale electrical drawings for exact location of the lighting fixtures. In general, the architectural reflected ceiling plans indicate the proper locations of lighting fixtures, unless otherwise noted on architectural plans.
- K. Unless otherwise shown on the Contract Drawings, lighting fixtures and/or fixture outlet boxes shall be provided with hangers to adequately support the complete weight of the lighting fixture. The design of hangers and the method of fastening other than what is shown on the Contract Drawings, or herein specified, shall be submitted to the Commissioner for approval.
- L. The Contractor shall provide all hangers, rods, mounting brackets, supports, frames, earthquake clips and other equipment normally required for the proper, safe and distortion-free installation in the various surfaces in which they appear. Determine surface types from the architectural drawings.
- M. Instructions: Each lighting fixture shall be packaged with complete illustration and instructions showing how to install. Install lighting fixtures in strict conformance with manufacturer's recommendations and instructions.
- N. The Contractor shall rigidly align continuous rows of lighting fixtures for true aligned appearance.
- O. The Contractor shall support all lighting fixtures independently of ductwork or piping.
- P. Splices in internal wiring shall be made with approved insulated "wire nut" type mechanical connectors, suitable for the temperature and voltage conditions to which they are subjected.
- Q. All wire utilized for connections to or between individual lamp sockets and lamp auxiliaries (i.e., wires which do not constitute "through circuit" wiring) shall be suitable for temperature, current, and voltage conditions to which it is subjected.
- R. The Contractor shall install reflector cones, baffles, aperture plates, light controlling elements for air handling fixtures and decorative elements after completion of ceiling tiles, painting and general cleanup.
- S. The Contractor shall replace blemished, damaged, or unsatisfactory fixtures as directed by the Commissioner.
- T. All pendant mounted lighting fixtures within the same room or area shall be installed plumb, and at a uniform height from the finished floor. Adjustment of desired height (if required) shall be made during the installation phase. Unless otherwise shown on the Contract Drawings, stems and canopies shall be matched to the associated lighting fixtures.
- U. 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 (150 mm) 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 (20-mm) metal channels spanning and secured to ceiling tees.

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. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Lighting fixtures:
 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 2. Install lamps in each luminaire.
- B. Temporary Lighting: If it is necessary, and approved by Commissioner, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
- C. The Contractor shall furnish and install lighting fixtures as noted on the drawings. Fixtures shall be completely wired and lamps installed and shall be in perfect operating condition at the time of completion.
- D. Setting and Securing: The Contractor shall set lighting fixtures plumb, square, and level with ceiling and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved shop drawings. Conform to the requirements of NFPA 70.
- E. Mounting: Mounting heights specified or indicated are to bottom of fixture for suspended and ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before installation is commenced and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed.
- F. Remote Mounting of Drivers: Distance between the driver and fixture shall not exceed that recommended by driver manufacturer. Verify, with driver manufacturers, maximum distance between driver and luminaire.
- G. Coordination: The installing Contractor shall communicate with other trades as appropriate to properly interface, schedule and coordinate installation of lighting fixtures with other work.
- H. Grounding: The Contractor shall ground non-current-carrying parts of electrical equipment. Where the copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

2. 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. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
3. Master/Remote Sign Configurations:
 - a. Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply, ballast, and/or battery for power connection to remote unit.
 - b. Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.
- C. Self-Luminous Signs: Powered by tritium gas, with universal bracket for flush-ceiling, wall, or end mounting. Signs shall be guaranteed by manufacturer to maintain the minimum brightness requirements in UL 924 for 20 years.
- D. Self-Luminous Signs: Using strontium oxide aluminate compound to store ambient light and release the stored energy when the light is removed. Provide with universal bracket for flush-ceiling, wall, or end mounting.

2.12 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: 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.

2.09 STEMS

- A. Each stem shall have a brass or steel swivel, hang straight, or other self-aligning device.
- B. Stems shall be made of rigid metallic (steel) pipe only, minimum wall thickness of 0.062".
- C. Wherever a fixture or its hanger canopy is applied to a surface mounted outlet box a finishing ring shall be utilized to conceal the box.
- D. Unless otherwise indicated, all stems shall match in color and finish the color of the fixture which they support. Where no color is indicated, stems shall be semi-gloss baked white enamel.
- E. Stems shall at the completion of installation and all other work be free of clamp marks, scratches and all other visual imperfections.
- F. Unless otherwise indicated, stems shall be provided in order to adequately mount and level each fixture run with proper structural support per manufacturer's recommendations.
- G. Pendant Fixtures: Install pendant lighting fixtures plumb and at a height from the floor as specified on the drawings. In cases where conditions make this impractical, refer to the Commissioner for direction. Use ball aligners and canopies on pendant fixtures unless otherwise noted.
- H. Pendant stems shall be equally spaced along every fixture run. If field conditions or fixture construction do not allow for this condition, the installing Contractor shall immediately notify the Commissioner prior to commencement of the work.

2.10 MISCELLANEOUS

- A. Where (or if) indicated all remote step-down transformers and ballasts shall be properly wired to fixtures to insure that voltage drop does not exceed 5%, regardless of transformer's or ballast's location.
- B. All remote step down transformers, ballasts & drivers shall be mounted in approved NEMA type enclosures and only located in areas previously deemed to be readily accessible by the Commissioner's maintenance personnel.
- C. Where indicated, all uplight or wall-wash coves utilizing LED equipment shall be installed so as to produce a continuous and unbroken band of light free of visual imperfections, socket shadows, light gaps, etc. The inability to provide this appearance shall be brought immediately to the Commissioner's attention prior to installation.
- D. All fixture lengths whether straight or curvilinear shall be fabricated based upon the fixture manufacturer's or contractor's field verified dimensions only.
- E. Fixture manufacturer shall coordinate conduit entry locations with installing contractor.

2.11 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with NYC Building Code.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.

- E. Where modifications of standard fixtures are specified, fixtures shall be modified as required with lamp sockets positioned to provide desired photometric performance.
- F. Specular clear alzak reflector cones and parabolic louvers specified with the use of LED lamps shall be provided with clear non-iridescent coating.
- G. All fixtures with removable reflectors, louvers or baffles shall be supplied with safety chains. Contractor shall be responsible for insuring that all safety chains are securely fastened to reflector and housing.

2.08 LENSES, LOUVERS AND DIFFUSERS

- A. Lenses/Louvers: General:
 - 1. All lenses, diffusers, and shielding media shall be properly and securely mounted within fixture assemblies. Lay in type lenses and louvers shall not be acceptable. All shielding materials shall be tightly fitted with no loose panels or parts and shall show no visible light leaks of unintentional or unscheduled light.
 - 2. All fixtures with removable cones, louvers or other shielding devices shall be supplied with safety chains. Contractor shall be responsible for insuring that all safety chains are securely fastened to housing and shielding device.
- B. Lenses: Plastic
 - 1. Unless otherwise indicated or otherwise authorized, all plastic shielding, lenses and diffusers shall be white opal clear 100% UV stabilized virgin acrylic or in special cases high impact polycarbonate (lexan). Use of polycarbonate lenses shall be restricted to those areas outlined in the National Electric Code (latest Bulletin). Use of polystyrene components is absolutely prohibited.
 - 2. Plastic for lenses and diffusers shall be formed of colorless 100% virgin acrylic as manufactured by Rohm & Haas, DuPont, G.E. or equally acceptable manufacturers. The quality of the raw material must meet American Society of Testing Materials (ASTM) standards, as tested by an independent test laboratory. Acrylic plastic lenses and diffusers shall be properly cast, molded or extruded as specified and shall remain free of any dimensional instability, discoloration, embrittlement or loss of light transmittance for at least 15 years.
- C. Lenses: Glass
 - 1. Unless otherwise indicated or authorized all glass shielding, diffusers or lenses shall be clear tempered borosilicate glass. Soda lime glass material shall not be acceptable. Submit samples of glass elements upon request.
 - 2. Glass used for lenses, refractors and diffusers in incandescent and tungsten halogen lighting fixtures shall be tempered for high impact and heat resistance; the glass shall be crystal clear in quality with a transmittance of not less than 92%. For exterior fixtures use tempered borosilicate glass, Corning No. 7740 or equal. For fixtures directly exposed to the elements and aimed above the horizontal with a radiant energy of 4.16 watts per square inch or greater, use Corning Vycor glass or equal.
 - 3. Where optical lenses are used, they shall be free from spherical or chromatic aberrations and other imperfections, which may hinder the functional performance of the lenses.
- D. Mechanical: All lenses, louvers or other light diffusing elements shall be removable but positively held so that hinging or other normal motion will not cause them to drop out.

2.06 FINISHES

- A. Painted surfaces shall be synthetic enamel with acrylic, alkyd, epoxy, polyester or polyurethane base, light stabilized, baked on at 350 degrees Fahrenheit minimum, catalytically or photo-chemically polymerized after application.
- B. White finishes minimum 90% reflectance (semi-gloss).
- C. Selection: Unless otherwise indicated, all external fixture finishes shall be as selected by the Commissioner. Unless otherwise indicated, all fixture finishes shall be semi-gloss polyester powder coat enamel (color to be selected by Commissioner).
- D. Undercoat: Except for stainless steel all ferrous metal surfaces shall be given a five stage phosphate treatment or other acceptable base bonding treatment before final painting and after fabrication.
- E. Unpainted non-reflecting surfaces shall be satin finished and coated with a baked-on clear lacquer to preserve the finish. Where aluminum surfaces are treated with an anodic process, the clear lacquer coating may be omitted.
- F. Unpainted aluminum surfaces: Finish interior aluminum trims with an anodized coating of not less than 7 mg. per square inch, of a color and surface finish as selected by the Commissioner. Finish exterior aluminum and aluminum trims with an anodized coating of not less than 35 mg. per square inch of a color and surface finish as selected by the Commissioner.
- G. Metal finishes: Provide finishes of the color and type indicated and having the following properties:
 - 1. Protection of metal from corrosion: 5-year warranty against perforation or erosion of the finish from weathering.
 - 2. Color retention: 5-year warranty against fading, staining, or chalking from weathering including solar radiation.
 - 3. Uniformity: Provide finish of uniform thickness and color, free from streaks, stains or orange peel texture.

2.07 REFLECTORS

- A. Reflectors, cones or baffles shall be absolutely free of spinning lines, stains, ripples or any marks or indentations caused by riveting to other assembly techniques. No rivets, springs or other hardware shall be visible after installation.
- B. Downlight reflectors shall provide minimum 45 degree lamp and lamp image cut-off unless otherwise specified.
- C. Cone flanges shall be formed as an integral part of the cone and shall have identical color and finish as the cone, except as shown. The flange's major surface shall be perpendicular to the cone axis.
- D. The reflecting surface of the cone or reflector shall be tested for proper sealing. Test per ASTM B136-63T. If any stain is visible, the specimen shall not be considered to have been properly sealed. Reflector cones shall be free of manufactured defects. The reflector inner surface shall be free of water spotting and shall maintain a reflectivity ratio of not less than 83% on clear specular finish.

input (0-10V) with a maximum of 500 microamps per driver or via electronic (Triac) type dimmer control. The control equipment must not impose a voltage greater than 11.0V peak maximum on the driver terminals and the short-term transient voltage must not exceed 14 volts. Control equipment intended to control more than one driver must be capable of sinking the current supplied to the control bus by the maximum number of drivers specified for the control device. The control terminals for the driver shall be isolated from the power lines and suitable for use as Class II terminals. Maximum voltage drop not to exceed 0.2 volts. Variability in output shall not exceed 5% in load or 1% line levels. Driver shall be designed for use in -40 degree Celsius environments with a high temperature tolerance of +60 degrees ambient, 80 degrees Celsius case rating. Total harmonic distortions shall not exceed 20% with a current crest factor of 1.5 maximum. All drivers shall be field replaceable.

E. Lamp Module

1. All manufacturer data to include LED module information including but not limited to:
 - a. Manufacturer of the LED module with part number or other device identifier.
 - b. LED module drive current, voltage, power
 - c. LED module lumen depreciation curves, life, CCT, CRI at an ambient temperature of 25 degrees Celsius
 - d. Board temperature of the LED module installed in the luminaire with proper heat sink, when the luminaire is operating at an ambient temperature of 25 degrees Celsius.
 - e. The color bin, CCT, and color shift variation of the LED module at the operating board temperature.
 - f. Color rendering index at the operating board temperature.
2. LED lamp modules shall be minimum CRI of 85 with tolerances as identified in Clause 7 IEC/PAS 62612.
3. White LED modules shall be available in either 3000°K, 3500°K, 4000°K, or as identified in Lighting Fixture Schedule.

2.05 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Electrical Supports and Seismic Restraints" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68 mm)
- F. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
 1. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

1. Luminaire performance claims shall be measured in accordance with the requirements of IEC/PAS 62612: Edition 1: 2009-06. The testing quantity for LED package lamps shall be a minimum of (20) twenty. The drive current and bin reference should be clearly documented.
2. All manufacturer data to include:
 - a. Luminaire lumen output
 - b. Luminaire power
 - c. Luminaire efficacy
 - d. Correlated Color Temperature, 3500°K CCT, 80 CRI or greater and \pm degree color shift over life
 - e. Luminaire life including lumen depreciation and failure
 - f. Luminous intensity distribution
3. Luminaire efficacy should be calculated from the initial lumen output of the luminaire that has reached thermal stability operating in an ambient temperature of 25 degrees Celsius and based on the total power of the LEDs and driver circuit.
4. Definition of life shall comply with Clause 10 IEC/PAS 62612. Life shall be based on lumen depreciation and failure and shall consist of an endurance test. It shall be clearly noted which part of life and lumen depreciation has been measured and what part has been calculated or extrapolated.
5. Lumen depreciation data shall clearly document the length of time a complete LED luminaire provides more than a percentage of the rated luminous flux under standard test conditions. For illuminating luminaires the percentage shall be 80%, indicated as L80. For direct view luminaires the percentage should be 50%, indicated as L50.
6. Thermal losses: The temperature of the p-n junction of the raw LED (die) (Tj) is to be measured at an ambient temperature of 25 degrees Celsius. In a luminaire the die will be operating at a higher temperature. All performance parameters are to measure the Junction Temperature and Board Temperature.
7. Thermal protection: All fixtures shall be provided with appropriate heat sink to maintain lamp life. Stated lamp life and output shall be measured and identified and documented with heat sink. Any variations from stated life or output without heat sink shall be clearly identified including Junction Temperature.
8. Warranty: Entire LED fixture shall carry a 5 year warranty.

C. Photometry

1. All fixtures shall be provided with absolute photometry and conducted in accordance with IES LM-79-08 Photometric Measurements of Solid State Lighting Products. Any deviations such as higher or lower drive currents or dies from other bins are to be clearly identified. Correction factors are to be provided with the results.

D. Drivers

1. Constant Current Drivers [non-dimming]: All constant current drivers shall be UL 1310 class 2 including short-circuit protection, high-power factor, with either 12v or 24v input, unless otherwise noted. The driver shall operation on the voltage they are connected to, 120 or 277v input power. Variability in output shall not exceed 5% in load or 1% line levels. Driver shall be designed for use in -40 degree Celsius environments with a high temperature tolerance of +60 degrees ambient, 80 degrees Celsius case rating. Total harmonic distortions shall not exceed 20% with a current crest factor of 1.5 maximum. All drivers shall be field replaceable.
2. PWM Dimming Drivers: All PWM dimming drivers shall be UL 1310 class 2 including short-circuit protection, high-power factor, with either 12v or 24v input, unless otherwise noted. The light output of the LED shall be controlled either by DC voltage applied to the control

- Z. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and drivers. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
- AA. Label shall include the following lamp and driver characteristics:
- BB. "USE ONLY" and include specific lamp type.
- CC. CCT and CRI for all luminaires.

2.03 LAMPS

- A. General:

Substitutions of lamps by manufacturers other than specified shall be equal in all respects of the following:

 - 1. Initial and maintained lumen output
 - 2. Lamp life
 - 3. Correlated color temperatures (in degrees Kelvin)
 - 4. Color rendering index (CRI)
 - 5. Compatibility with specified equipment
- B. All lamps shall comply with the applicable requirements of the Energy Policy Act of 1992 & 2005 or its latest edition.
- C. All lamps where applicable shall comply with ANSI C78 Series standards.
- D. Light Emitting Diodes:
 - 1. LEDs shall be of the specified wattage and lumen output as identified in the fixture schedule. Contractor shall replace any LED failing within the 1 year guarantee period after final written acceptance by the Commissioner. Refer to Section 2.04.
- E. The Contractor shall provide all lamps as called out in the lighting fixture schedule or specifications. The Contractor shall, upon request, produce a schedule of the lamps being proposed for use on the project.

2.04 SOLID STATE LIGHTING (LED) FIXTURES

- A. General
 - 1. Lighting fixtures shall conform to IES LM-79-08 and LM-80-08 standards.
 - 2. All fixtures shall be RoHS compliant.
 - 3. All fixtures shall conform with standards prepared by CIE, IES, UL, and other standards organizations as they apply to solid state lighting technologies. Including but not limited to:
 - a. 2-46 CIE/ISO standards on LED intensity measurements
 - b. TC2-50 Measurements of the optical properties of LED clusters and arrays
 - c. TC2-58 Measurements of LED radiance and luminance
 - d. TC2-63 Optical measurement of High-Power LEDs
 - e. TC2-64 High speed testing methods for LEDs
- B. Performance

frames and rings shall be one piece or constructed with electrically welded butt joints and of sufficient size and strength to sustain the weight of the fixture.

- M. Yokes, brackets and supplementary supporting members needed to mount lighting fixtures to carrier channels, suitable ceiling members or other structure shall be furnished and installed by the Contractor.
- N. For steel and aluminum fixtures all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel fixtures, all hardware shall be stainless steel. Whenever possible all fasteners shall be captive type. Where indicated provide tamper resistant fasteners.
- O. Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surfaces will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. All welded surfaces shall be free of weld splatter and welding oxides.
- P. Extruded aluminum frame and trim shall be rigid and manufactured from 6063-T3 aluminum alloy without blemish or warpage in the installed product. Miter cuts shall be accurate. Joints shall be flush and without burrs. Cuts shall maintain alignment with the light fixture located in its final position.
- Q. All extruded aluminum fixtures shall be fabricated of 6063-T3 alloy (min. wall thickness .120) and in all cases shall be provided with heavy gauge internal alignment brackets in order to assure tight joints and a clean level and continuous appearance after installation. Unless otherwise noted, all end plates shall be continuously welded, filled and ground prior to application of final paint finishes so as to present a clean, seamless and monolithic appearance. Exposed fasteners on end plates shall be absolutely prohibited.
- R. All fixtures with removable louvers, lenses, reflectors, refractors, cones or other shielding devices shall be supplied with integral safety chains. Contractor shall be responsible for insuring that all safety chains are securely fastened to shielding device and fixture housing.
- S. Exposed Fasteners: All fasteners at every product and assembly exposed to view or accessible within the public's reach shall be tamper resistant and stainless steel.
- T. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- U. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
- V. White Surfaces: 92 percent.
- W. Specular Surfaces: 87 percent.
- X. Diffusing Specular Surfaces: 83 percent.
- Y. 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.

preclude accidental falling of hinged door closure frames during re-lamping operations and while secured in operating position.

- D. Recessed, surface or pendant lighting fixtures shall be suspended from structural members or ceiling structure members of minimum 1-1/2" channels, by standard bar hangers, or other approved means. Fixture locations shall be coordinated with ceiling patterns. Refer to architectural reflected ceiling plan for exact location of fixtures and architectural rooms finish schedule for ceiling construction details and mounting heights. The installing contractor shall provide all structural steel and related supports as required or necessary to properly and safely install and support the fixtures.
- E. Fixture wiring shall be suitable for the temperature rating of the fixture; wiring through fixture channels shall be done with Type SFF2 wire. Where a junction box is required, to change from branch circuit to fixture wiring, use approved feed through, pre-wired fixture wiring, and install a separate junction box. The junction box shall be fully accessible after installation of covering materials. Where flexible conduit or portable cord is used, a grounding jumper shall be installed. All fixtures shall be grounded. Housings shall be so constructed that all electrical components are easily accessible and replaceable without removing fixtures from their mountings, or disassembling adjacent construction.
- F. All recessed, pendant and surface mounted lighting fixtures unless otherwise noted or directed shall be UL listed for through-wiring and shall be furnished complete with all required integral wiring and all required flexible conditions, pigtails and related accessories necessary for suitable operation and installation.
- G. All recessed fixtures, which are to be installed in insulated ceilings, shall be provided with UL listed thermocouple protection. Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- H. All materials, accessories, and other related fixture parts shall be new and free from defects which in any manner may impair their character, appearance, strength, durability and function, and be effectively protected from any damage or injury from the time of fabrication to the time of delivery and until final written acceptance of the work by the Commissioner.
- I. Enclosures: Fabricate fixture enclosures with a minimum No. 20 gauge (0.0359 inch) thick cold rolled sheet steel. Enclosures may be constructed of other metals, provided they are equivalent in mechanical strength, durability and in compliance with local codes and acceptable for the purpose.
- J. Sheet metal work: All sheet metal work shall be free from tool marks and dents, and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. All intersections and joints shall be formed true of adequate strength and structural rigidity to prevent any distortion after assembly. Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- K. Castings: All aluminum, iron or composite castings shall be exact replicas of the approved patterns and shall be free of sand pits, blemishes, scales and rust, and shall be smoothly furnished. Tolerance shall be provided for any shrinkage of the metal castings in order that the finished castings will accurately fit in their designated locations. Unless otherwise noted for cast aluminum components use copper free 319 or 443 aluminum alloy only. For cast iron components use ASTM Spec A48-83 Class 30 gray iron.
- L. Mounting frames and rings: If ceiling system requires, each recessed fixture shall be furnished with a mounting frame or ring compatible with the ceiling in which they are to be installed. The

Contract Drawings for prime spec with part numbers and approved equal manufacturers for each fixture type.

2. Basis-of-Design Product: The design for each lighting fixture is based on the product named in the Lighting Fixture Schedule. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified. Manufacturers listed as prime spec or approved equal in the Lighting Fixture Schedule and listed below shall be assumed capable of supplying the listed fixtures unless clearly written exceptions are set forth in their quotations. Any such exceptions shall immediately be brought to the attention of the Commissioner.
3. Specified Manufacturers:
 - F1/F1A: Columbia Lighting or approved equal by Metalux, Lithonia.
 - F2: Columbia Lighting or approved equal by Metalux, Lithonia.
 - F3/F3a/F3b/F3c: Lumenwerx, or approved equal by Focal Point, Pinnacle.
 - F4/F4a: Lumenwerx, or approved equal by Prudential, Lumium.
 - F5: Lumenwerx, or approved equal by Focal Point, Pinnacle.
 - F6/F6A: Bartco, or approved equal by Lithonia, Failsafe.
 - F7: Pinnacle, or approved equal by Focal Point, Mark Lighting.
 - F8/F8a: Pinnacle, or approved equal by others.
 - F9: N/A (Not used).
 - F10: Bocafletcher, or approved equal by Ecosense, ColorKinetics.
 - F11: Pathway Lighting, or approved equal by USAI, Edison Price.
 - F12: Solais (Lamp), LSI (Luminaire) or approved equal by HALO, WAC.
 - F13: Marset, or approved equal by Astro Lighting, Others.
 - F14/F14a: Philips ColorKinetics, or approved equal by Traxon, Winona Lighting.
 - F15: Pathway Lighting, or approved equal by Edison Price, USAI.
 - F16: Intense Lighting, or approved equal by Cole, IO Lighting.
 - F17: Holophane, or approved equal by Cooper Crouse-Hinds, Hubbell.
 - FX1: Bega Lighting, or approved equal by WAC Lighting, Luminis.
 - FX2: Bocafletcher, or approved equal by Ecosense, ColorKinetics.
 - FX3: HK Lighting, or approved equal by Lumiere, Bega.
 - FX4: WE-EF, or approved equal by Lumascope, BK Lighting.
 - FX5: Bocafletcher, or approved equal by Ecosense, Color Kinetics.
 - FX6: Bega, or approved equal by Design Plan, WE-EF.
 - FX7: RAB Lighting, or approved equal by Phoenix, Lithonia.

2.02 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Lighting fixtures shall be of rigid construction, dimensionally stable, and shall be assembled with secure fastenings. Ferrous parts shall be protected from corrosion by plating or shall be finished with high reflectance enamel with non-yellowing binder and high pigment to binder ratio, with semi-gloss finish. Ferrous parts shall be prepared for finish by industry standard finishing process (see Finishes). Non-ferrous metals (i.e. aluminum) unless otherwise noted be treated with a semi-gloss polyester powder coat enamel finish.
- B. Provide each fixture with lamps as indicated in the lighting fixture schedule. Where/or if lamps are not indicated, contact the Commissioner for clarification.
- C. Hinged door closure frames shall operate smoothly without binding. Where possible fabricate frames to allow lamp installation/removal without tools. Hinge mechanism shall be designed to

Washington, DC 20402

phone (202) 377-2000

EPA Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

phone (202) 382-2090

NBS National Bureau of Standards
(U.S. Department of Commerce)

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
Washington, DC 20402

phone (202) 523-6091

PS Product Standard of NBS
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402

phone (202) 783-3238

PART 2. PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection.
- B. In the Lighting Fixture 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. Refer to the Lighting Fixture Schedule in the

Quincy, MA 02169-7471 phone (617) 770-3000
www.nfpa.org fax (617) 770-0700
publicfire@nfpa.org

UL Underwriters Laboratories
333 Pfingsten Rd.
Northbrook, IL 60062-2096 phone (847) 272-8800
www.ul.com fax (847) 272-8129
CustomerExperienceCenter@ul.com

2. Federal Government Agencies:

Names and titles of federal government standard or specification producing agencies are frequently abbreviated. The following acronyms or abbreviations as may be referenced in the Contract Documents indicate names of standard specification producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up-to-date as of the date of the Contract documents.

CFR Code of Federal Regulations
Available from the Government Printing Office
N. Capitol St. between G and H St., NW
Washington, DC 20402 phone (202) 783-3238

CPSC U.S. Consumer Product Safety Commission
4330 East West Highway
Bethesda, MD 20814 phone (800) 638-2772

CS Commercial Standard
(U.S. Department of Commerce)
Government Printing Office

Cortland, NY 13045 fax [607] 756-9891
www.intertek-ettsemko.com
janna.gutchess@intertek.com

IESNA Illuminating Engineering Society of North America
120 Wall Street, 17th Floor
New York, NY 10005-4001 phone [212] 248-5000
www.ies.org fax [212] 248-5017
ies@ies.org

IEEE Institute of Electrical and Electronic Engineers
3 Park Avenue, 17th Floor
New York, NY 10016 phone [212] 419-7900
www.ieee.org fax [212] 752-4929
webmaster@ieee.org

NEC National Electric Code (see NFPA)

NEMA National Electrical Manufacturer's Association
1300 N. 17th St., Suite 900
Arlington, VA 22209 phone [703] 841-3200
www.nema.org fax [703] 841-5900
gmoniznema@verizon.net

NFPA National Fire Protection Association
1 Batterymarch Park

25 W 43rd Street, 4th Floor

New York, NY 10036

phone (212) 354-3300

www.ansi.org

fax (212) 398-0023

info@ansi.org

ASHRAE

American Society of Heating, Refrigeration & Air Conditioning Engineers

1791 Tullie Circle, N.E.

Atlanta, GA 30329

phone (404) 636-8400

<http://www.ashrae.org/>

Fax (404) 321-5478

ASTM

American Society for Testing and Materials

100 Barr Harbor Drive

PO Box C700

phone (877) 909-2786

West Conshohocken, PA 19428-2959

fax (610) 832-9555

www.astm.org

service@astm.org

AWS

American Welding Society

8669 NW 36 Street, #130

phone (800) 443-9353

Miami, FL 33166-6672

fax (305) 443-7555

www.aws.org

info@aws.org

ETL

Electrical Testing Laboratories, Inc.

3933 US Route 11

Industrial Park

phone (607) 753-6711

Where compliance with two or more standards or criteria is specified, and where these standards establish different or conflicting requirements for minimum quantities or performance quality levels, the most stringent requirement will be enforced, and henceforth provided by the Contractor unless the Contract Documents or the Commissioner specifically indicates otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent, to the Commissioner for a decision before proceeding.

D. Minimum Quantities or Quality Levels:

In every instance the quantity or quality level shown or specified is intended to be the minimum to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are minimum or maximum values, as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to the Commissioner for a decision before proceeding.

E. Copies of Standards:

The Contract Documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the work. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed for proper performance of the work the Contractor is required to obtain such copies directly from the publication source.
2. Although copies of standards needed for enforcement of requirements may be required submittals, the Commissioner reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

F. Abbreviations and Names:

1. Trade association names and titles of general standards are frequently abbreviated. The following acronyms of abbreviations, as referenced in Contract Documents, are defined to mean the association names. Both names and addresses are subject to change, and are believed to be, but are not assured to be, accurate and up-to-date, as of the date of Contract Documents:

ACIL American Council of Independent Laboratories

1875 I Street, NW, Suite 500

Washington, DC 20006

phone (202) 887-5872

www.acil.org

fax (202) 887-0021

info.acil.org

ANSI American National Standards Committee

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

LIGHTING EQUIPMENT LAMPS AND BALLASTS
26 5100 - 9

1.13 MOCKUPS

- A. The specific design requirements of several building conditions will mandate the necessity of full scale on site mockups prior to final authorization (release) to fabricate. The Contractor shall include as part of his bid provision for complete on site mockups of the following conditions:

TYPE	LOCATION	MAGNITUDE (extent)
F3	Conference Room	{1} One Fixture in Slat Ceiling
F3b	Level 2 Corridor	{1} One Continuous 8'-0" Run
F4	Apparatus	{1} One Continuous 12'-0" Run
F5	Training Tower	{1} One 8'-0" Run
F6	Kitchen	{1} One Fixture under kitchen millwork
F10	Stair 1	{1} One Continuous 8'-0" Run (intersection condition)
FX2	Site	{1} One Fixture in Fence
FX5	Sign	{1} One 5'-0" run (includes 2 mounting arms)

- B. The Contractor shall make every effort to install all mockups to be viewed during the course of one review session. Should mockups not be ready for viewing on the scheduled mockup date, the Contractor shall be responsible for all travel rebooking fees, upcharges, and other additional fees that may occur as a result of rescheduling the mockup date.

1.14 INDUSTRY STANDARDS

- A. Applicability of Standards:

Except where more explicit or stringent requirements are written into the Contract Documents, applicable construction industry standards have the same force and effect as if found in or copied directly into the Contract Documents. Such industry standards are made a part of the Contract Documents by reference.

1. Referenced standards (standards referenced directly in the contract documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the work.
2. Unreferenced standards are not directly applicable to the work, except as a general requirement of whether the work complies with recognized construction industry standards.

- B. Publication Dates:

Except as otherwise indicated, where compliance with an industry standard is required, comply with the latest standard in effect as of date of Contract Documents.

- C. Conflicting Requirements:

- F. The Contractor shall be solely responsible for coordinating and expediting the timely procurement and delivery for all lighting equipment, lamps, ballasts and related components for the project.
- G. Specifications and drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details not usually indicated on the drawings nor specified, but that are necessary or normally required for the proper execution, completion, installation and operation of the fixtures, shall be included, the same as if they were herein specified or indicated on the drawings.
- H. Omissions: The City of New York shall not be held responsible for the omission or absence of any detail, construction feature, etc. which may be normally required in the production of the lighting fixtures. The full and complete responsibility for accurately purchasing, fabricating and installing the lighting fixtures described herein to the fulfillment of those specifications including compliance with all regulatory bodies (i.e.: UL) shall rest solely with the Contractor.

1.11 SPARES

As part of this contract, the Contractor shall furnish the following:

- A. Luminaires: 1 for each 10 [10%] of each type and rating installed.
Furnish at least 1 of each type.
- B. Lamps & LED Modules: 1 for each 10 [10%] of each type and rating installed.
Furnish at least 12 of each type.
- C. Louvers/Lenses: 1 for each 20 [5%] of each type and rating installed.
Furnish at least 5 of each type.
- D. Drivers: 1 for each 20 [5%] of each type and rating installed.
Furnish at least 5 of each type.
- E. Globes and Guards: 1 for each 10 [10%] of each type and rating installed.
Furnish at least 5 of each type.

1.12 SAMPLES

- A. Upon request, the contractor shall submit for review one representative sample for each or any lighting fixture required under this Contract. After sample acceptance, the fixture shall be sent to the project for use as a standard. In the event the submission is rejected, the fixture will be returned to the manufacturer who shall immediately make a new submission which meets the contract requirements. Preliminary design or shop drawings shall not be accepted in place of prototype samples.
- B. Shipping: The samples must be actual working unit of fixtures to be supplied and shall be submitted complete with specified lamp(s), 120 volt ballast/transformer complete with cord and plug set and ready for hanging, energizing and examining sample shall be shipped (prepaid) by Contractor to the Commissioner or as otherwise specified or directed.

- E. Where possible, maintain protective covering until installation is complete and remove such coverings as part of final cleanup.

1.09 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.
- B. All lighting fixtures (unless noted otherwise) and accessories shall carry a minimum two year (2) warranty after final written acceptance by the Commissioner.
- C. LED luminaires with replaceable components (LED modules and drivers) shall carry a minimum five years (5) warranty for the components from the date of final written acceptance by the Commissioner. LED luminaires with non-replaceable components shall carry a minimum ten year (10) warranty for the entire luminaire from the date of final written acceptance by the Commissioner.
- D. All electronic drivers shall carry a minimum five (5) year warranty from date of luminaire acceptance.

1.10 TECHNICAL AND ADMINISTRATIVE REQUIREMENTS

- A. All information identified in the Contract Documents Schedules, Details, Layouts [See drawings] and Specifications [Section 26 51 00: Parts 1, 2 & 3] shall be considered to form a complete and integrated Specification for Lighting Fixtures and Control Systems in the agreed upon Scope Areas. The Contractor shall be responsible for contacting the Commissioner regarding the proper interpretation of all information indicated on the Lighting Fixture Schedules, Details and Specifications.
- B. The submission of a proposal by the Contractor will be construed as evidence that a careful, complete and thorough examination of the premises, existing job conditions and Contract Documents has been made and later claims for labor, materials or equipment required or for difficulties encountered, which could have been foreseen had such an examination been made, will not be recognized. It shall also constitute a representation that the Contractor has checked and verified all quantities, work and materials involved and shall take complete responsibility for any deficiencies encountered thereafter.
- C. The Contractor shall be solely responsible for verifying all fixture quantities, lengths and clearances required and shall inform the Commissioner of job conditions at variance with fixtures as specified or detailed which affect installation or location.
- D. The Contractor shall insure that the lighting fixture manufacturer shall keep on file and make available for review by the Commissioner complete Quality Control and Quality Assurance records for all phases of production for all lighting fixtures to be supplied under this project.
- E. Upon request the Contractor shall submit for review by the Commissioner verification that he has solicited pricing from all manufacturers which have been listed as "prime spec" and "approved equal." Upon request the Contractor shall submit for review itemized (line item) unit equipment costs for all fixtures to be provided under the Scope of this Contract.

- E. Underwriters Laboratories, Inc. (UL): Comply with applicable UL standards pertaining to interior lighting equipment [see Section 1.04].
- F. Materials and equipment, as well as workmanship shall conform to the highest commercial standards and shall be as specified and/or as indicated on the drawings. Parts not specifically identified shall be made of materials most appropriate for their intended use.
- G. Product Data: Submit manufacturer's data in compliance with 1.05B.
- H. Photometric Data: If requested supply complete photometric data for each fixture, photometric reports shall be rendered by an independent testing laboratory (NRTL compliant as defined by OSHA in 29 CFR 1910.7) developed according to methods of the Illuminating Engineering Society (IESNA) of North America and NVLAP as described in Section 1.05 C.
- I. 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.
- J. FMG Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.
- K. Mockups: Provide interior lighting fixtures for room or module mockups, complete with power and control connections.
 - 1. Obtain Commissioner approval of fixtures for mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Approved fixtures in mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 4. The Contractor shall make every effort to install all mockups to be viewed during the course of one review session. Should mockups not be ready for viewing on the scheduled mockup date, the Contractor shall be responsible for all travel rebooking fees, upcharges, and other additional fees that may occur as a result of rescheduling the mockup date.
 - 5. Refer to 1.13 mockups.

1.07 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction elements that penetrate ceilings or are supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.
 - 1. Conform to approved Coordination Drawings.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Lighting fixtures shall be wrapped for protection during delivery, storage, and handling. Wet or damp wrapping shall be removed, and disposed of, to prevent staining finish.
- B. Deliver materials in manufacturer's original, unopened, protective packaging.
- C. Store materials in original packaging in a manner to prevent soiling and physical damage, prior to installation.
- D. Handle in a manner to prevent damage to finished surfaces.

- H. "Approved Equal" specification status does not and shall not exempt the identified manufacturers from full and complete compliance with all criteria identified either in the specifications or as attributed to "prime specification" equipment with regards to photometric performance, brightness control, size, finishes, credentials or experience, etc. Consideration, acceptance or rejection of any proposed submittal at any time shall rest solely upon the evaluation of the Commissioner for those areas within the project scope.
- I. Coordination Drawings: Reflected ceiling plan(s) 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. Lighting fixtures.
 - 2. Suspended ceiling component
 - 3. Structural members to which suspension systems for lighting fixtures will be attached.
 - 4. Other items in finished ceiling or located within unfinished ceilings including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Sprinklers.
 - d. Smoke and fire detectors.
 - e. Occupancy sensors.
 - f. Access panels.
 - g. Photocells
 - 5. Perimeter moldings.
- J. Samples for Verification: Refer to Section 1.12 Samples
 - 1. Lamps: Specified units installed.
 - 2. Accessories: Cords and plugs.
- K. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
- L. Field quality-control test reports.
- M. Warranties: Sample of special warranties specified in Section 1.09.

1.06 QUALITY ASSURANCE

- A. All lighting fixtures shall be manufactured, furnished, and installed in compliance with the agencies and standards listed in Section 1.04. All fixtures shall bear the appropriate UL (or ETL) and IBEW identifications.
- B. Manufacturers: Provide products of firms regularly engaged in the manufacture of interior and exterior lighting equipment of the types and ratings whose products have been in satisfactory use in similar service for not less than 3 years. Manufacturers not listed as prime spec or approved equal must include a list of completed projects and dated catalogue pages or drawings indicating length of experience.
- C. National Electrical Manufacturers Association (NEMA): Comply with applicable requirements of NEMA LE 4, "Recessed Luminaires, Ceiling Compatibility" pertaining to recessed luminaires.
- D. National Fire Protection Association (NFPA): Comply with NFPA 70, "National Electrical Code," as applicable to construction and installation of interior building lighting fixtures and emergency lighting.

- of construction, arrangements of components and wiring, gasketing for weather tightness, means of mounting luminaire and adjusting aspect, finishes, electrical data including volts, amperes and watts.
2. Details of attaching luminaires and accessories.
 3. Details of installation and construction.
 4. Luminaire materials.
 5. Lamp ANSI designation, initial and mean lumen output, average rated hours of lamp life and lamp mortality curve, color temperature and color rendering index.
 6. Ballast UL listing, volts, lamp and line amperes, input watts and minimum lamp starting temperature.
- C. Photometric Data: If requested supply complete photometric data for each fixture, photometric reports shall be rendered by an independent testing laboratory developed according to methods of the Illuminating Engineering Society (IESNA) of North America as follows:
1. Luminaire description and dimensions, including driver data for LED fixtures.
 2. Candela distribution data, presented graphically and numerically in no more than 5 degree increments (5, 10, 15, etc.). Data developed for up and down quadrants normal, parallel and at 22.5, 45, 167.5 degrees to fixture axis if light output is asymmetric.
 3. Zonal lumens stated numerically in 10 degree increments (5, 15, etc.) and fixture efficiency.
 4. Luminance table with data presented numerically, showing maximum luminance of the fixture at the shielding angles. Readings should be taken both crosswise and lengthwise in the case of LED fixtures or fixtures with asymmetric distribution.
 5. Coefficients of utilization table.
 6. Photometric data for LED luminaire: See also 2.04 C.
 7. Driver UL listing, volts, lamp and line amperes, input watts and minimum lamp starting temperature.
 8. Lamp ANSI designation, initial and mean lumen output, average rated hours of lamp life and lamp mortality curve, color temperature and color rendering index.
- D. 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. Shop drawings of all special or modified standard lighting equipment shall be submitted in reproducible form. Fixture fabrication details shall be drawn at either full size or half size scale. Fixture fabrication details shall illustrate a minimum of three (3) critical views indicating all fabrication, and assembly methods, materials, material gauges and finishes to be employed.
 3. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
 4. Wiring Diagrams: For power, signal, and control wiring.
 5. Warranty: Sample of special warranty (see 1.09).
- E. Submittals or shop drawings lacking sufficient detail to indicate clear and complete compliance with Contract Documents shall be rejected.
- F. Installation instructions.
- G. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

- E. Luminaire: Complete lighting fixture, including ballast housing if provided.
- F. RCR: Room cavity ratio.

1.04 REFERENCES

- A. ANSI American National Standards Institute
- B. ANSI C 2 National Electrical Safety Code
- C. ASTM American Society for Testing and Materials
- D. EPACT 1992 The Energy Policy Act of 1992: Lamp Efficiency Labeling/Standards
- E. EPACT 2005 The Energy Policy Act of 2005: Lamp Efficiency Labeling/Standards
- F. IBC International Building Code
- G. IECC International Energy Conservation Code
- H. IESNA Illuminating Engineering Society of North America
- I. NEMA National Equipment Manufacturers Association
- J. NEMA WD6 Wiring devices - Dimensional requirements
- K. NEMA LE4 Recessed luminaires: ceiling compatibility
- L. NEMA FA 1 Outdoor floodlighting equipment
- M. NFPA National Fire Protection Association
- N. NFPA 101 Life Safety Code Administrative Code
- O. NYC Elec Code New York City 2011 Electrical Code
- P. OSHA Occupation Safety and Health Administration
- Q. UL Underwriters Laboratories
- R. UL 57 Electric Lighting Fixtures
- S. UL 844 Electric Lighting Fixtures for use in hazardous (classified) locations.
- T. UL 924 Emergency Lighting and Power Equipment

1.05 SUBMITTALS

- A. Conform to the requirements of DDC General Conditions.
- B. Product Data: For each luminaire and support component, arranged in order of lighting unit designation. Submit manufacturer's data on features, accessories, finishes, and the following, in reproducible form:
 - 1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters. Submit dimensioned and detailed drawings assembled in luminaire "type" alphabetical order ["F", "FX" Series] and showing: materials

SECTION 26 5100 - LIGHTING EQUIPMENT LAMPS AND BALLASTS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

1.02 DESCRIPTION

- A. General: Extent of interior lighting fixture work is indicated on drawings and schedules, by requirements of this Section, and Section: "Electrical Basic Requirements."
- B. This section below includes the following:
 - 1. Interior lighting fixtures, lamps and ballasts.
 - 2. Exterior lighting fixtures, lamps and ballasts.
 - 3. Lighting fixture supports.
- C. Related Sections include the following:
 - 1. Division 26 Section "Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.
 - 2. Basic Materials and Methods.
 - 3. Emergency Power System
 - 4. Wires and Cables
 - 5. Wiring Devices
- D. Types: Types of interior lighting fixtures, lamps and ballasts in this Section shall include the following:
 - 1. LEDs
- E. Other Divisions: Refer to other divisions of the specification for the following:
 - 1. Division 5: Miscellaneous Metal Work
 - 2. Division 9: Ceiling Tile
 - 3. Division 9: Ceiling Suspension System

1.03 DEFINITIONS

- A. BF: Ballast factor.
- B. CRI: Color-rendering index.
- C. CU: Coefficient of utilization.
- D. LER: Luminaire efficacy rating.

3. Complete startup checks according to manufacturer's written instructions.
 4. Perform visual and mechanical inspection of each unit to verify light functionality.
- B. Manufacturers representative shall visit site, verify installation, and submit a letter stating that equipment and installation meets the manufacturers requirements and manufacturers warranties are in effect.

END OF SECTION

SPD shall utilize a NEMA 12 enclosure. If no circuit breaker is available add internal disconnect switch.

2.03 PANELBOARD SUPPRESSORS

- A. Acceptable Manufacturers and Models:
 - 1. LEA International Inc. – SP100
 - 2. Current Technology – TG3100 MD
 - 3. Liebert – ACV-111-RKE
 - 4. Surge Suppression Inc. SSMD-12
- B. SPD shall be a multi-stage non-parallel protector. See one-line diagram and panelboard schedule to confirm voltages. SPD's minimum surge current capacity shall be 100kA per phase (L-N plus L-G) and 50kA per mode (L-N, L-G, L-L and N-G).
- C. SPD shall meet all specification requirements in section 2.1 (D through F) and as follows:
 - 1. SPD shall be non-modular design. SPD shall provide the following monitoring features: dry contacts and audible alarm. SPD shall utilize a NEMA 1 enclosure or better.

PART 3.00 – EXECUTION

3.01 INSTALLATION OF SURGE PROTECTIVE DEVICES

- A. The specified unit shall be installed external to switchboard, distribution and panelboard as stand alone. Internal products will not be accepted. All SPD devices shall be installed on the load side of service switches or overcurrent device in separately derived systems.
- B. The specified service entrance/switchboard/SPD Protective devices shall be installed with the shortest lead length possible from the service entrance switchboards being protected, must have a grounding of 25 Ohms (NEC Article 250.56) or less and shall avoid any unnecessary or sharp bends. Utilize a 60 amp breaker for each connection. See manufacturer's installation manual. Install for each Utility Service. Provided for Utility Service.
- C. The specified distribution panel, SPD Protective devices shall be installed with the shortest lead length possible from the distribution panels being protected, must have a grounding of 25 Ohms (NEC Article 250.56) or less and shall avoid any unnecessary or sharp bends. Utilize a 60 breaker for connection means. See manufacturer's installation manual. Install for each distribution panel and at emergency generators.
- D. The specified branch panelboard system shall be installed with the shortest lead length possible from the branch circuit panelboard, being protected; must have a grounding of 25 Ohms (NEC Article 250.56) or less and shall avoid any unnecessary or sharp bends. Utilize a 30 amp breaker for connection means. See manufacturer's installation manual. Install for each branch panelboard.

3.02 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

3.03 FIELD QUALITY CONTROL

- A. Testing: Contractor shall perform the following field quality-control testing:
 - 1. After installing surge protective devices, but before electrical circuitry has been energized verify that the unit voltage and connecting equipment voltage is same.
 - 2. Verify per NEC 285.6 that the SPD AIC rating is equal or greater to connecting equipment.

in addition to, and run concurrent with, other warranties made by contractor under requirements of the Contract Documents.

- B. Manufacturer shall provide a product warranty for a period of not less than three (3) years from date of installation. Warranty shall cover unlimited replacement of SPD or modules during the warranty period. Those firms responding to this specification shall provide proof that they have been regularly engaged in the design, manufacturing and testing of SPD for not less than three (3) years.

PART 2.00 – PRODUCTS

2.01 SERVICE ENTRANCE SUPPRESSORS

- A. Acceptable Manufacturers and Models:
1. LEA International Inc. – PV400
 2. Current Technology – TG3-300 MD
 3. Liebert – SI-040-ANCE
 4. Surge Suppression Inc. – SSMD40
- B. SPD shall be a multi-stage parallel protector. See one-line diagram and panelboard schedule to confirm voltages. SPD's minimum surge current capacity shall be 400kA per phase (L-N plus L-G) and 200kA per mode (L-N, L-G, L-L and N-G).
- C. SPD shall be modular design with field replaceable modules per phase. Each protection module shall have a visual indicator that signifies that the protection circuitry is powered. The unit shall not be taken off line to verify integrity of system. Redundant status indicators shall be mounted on the front of the door that monitors the system protection circuitry.
- D. SPD shall contain a technology that utilizes multiple thermally protected metal oxide varistors (MOV) per mode.
- E. SPD shall be labeled as minimum with Type 2 (verifiable at UL.com). Every component of every mode, including N-G, shall be protected by internal thermal protection. SPDs relying upon external or supplementary installed safety overcurrent protection do not meet the intent of this specification.
- F. All primary transient paths shall utilize copper wire, aluminum bus bar and lugs of equivalent capacity to provide equal impedance interconnection between phases. No plug-in module or components shall be used in surge carrying paths.
- G. SPD shall provide the following monitoring features: dry contacts, digital surge counter and audible alarm with alarm disable switch. Equipment shall utilize a NEMA 12 enclosure.
- H. If no circuit breaker is available add internal disconnect switch.

2.02 DISTRIBUTION PANEL SUPPRESSORS

- A. Acceptable Manufacturers and Models:
1. LEA International Inc. – LS 200P
 2. Current Technology – TG3200MD
 3. Liebert – LM-100-ANCE
 4. Surge Suppression Inc. – SSMD20
- B. SPD shall be a multi-stage parallel protector. See one-line diagram and panelboard schedule to confirm voltages. SPD's minimum surge current capacity shall be 200kA per phase (L-N plus L-G) and 100kA per mode (L-N, L-G, L-L and N-G).
- C. SPD shall meet all specification requirements in section 2.1 (D through F) and as follows:
1. SPD shall be modular design with a field replaceable module. SPD shall provide the following monitoring features: dry contacts, surge counter and audible alarm with alarm disable switch.

1.07 STANDARDS

- A. UL 1449 3rd Edition. Underwriters Laboratories Safety Standard For Surge Protection Devices.
- B. Nec Article 285. National Electrical Code 2008 Rev.
- C. NFPA 780. STANDARD FOR THE INSTALLATION OF LIGHTNING PROTECTION SYSTEMS.
- D. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and C62.41.2 – 2002 rev. IEEE C62.45 – 2002 rev. IEEE Std. 1100 "The Emerald Book" Section 8.4.2.5
- E. CBEMA (ITIC) AND IEC - (Computer Business Equipment Manufacturers Association Or Information Technology Industry Council And International Electrotechnical Commission Define Clamping Voltage Tolerance Guidelines For Sensitive Equipment).
- F. All manufacturers must comply with above listed standards and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

1.08 QUALITY ASSURANCE

- A. Source Limitations: Obtain all suppression devices and accessories through one source from a single manufacturer.

1.09 PROJECT CONDITIONS

- A. Placing into Service: Do not energize or connect service entrance equipment, panelboards, control terminals, or data terminals to their sources until the surge protective devices are installed and connected.
- B. Each protection device shall have a capacitive filtering system connected in each Line to Neutral (L-N){Wye} mode or Line to Line (L-L){Delta} mode to provide EMI/RFI noise attenuation.
- C. Protection modes: The SPD shall provide Line to Neutral (L-N){Wye}, Line to Ground (L-G){Wye or Delta}, Line to Line (L-L){Delta} and Neutral to Ground (N-G){Wye} protection.
- D. Service Conditions: Rate surge protective devices for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage (MCOV): Should be tested to 115% per UL 1449 3rd.
 - 2. Operating Temperature: 30 to 120 deg F (0 to 50 deg C).
 - 3. Humidity: 0 to 95 percent, noncondensing.
 - 4. Altitude: Less than 12,000 feet above sea level.

1.10 COORDINATION

- A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.
- B. All devices must be installed on the load side of the facility after the first overcurrent protection or disconnect.
- C. Products shall be installed external to service, distribution, and branch panel equipment. All SPDs must have the same or greater AIC, Interrupting, or Fault rating of the equipment the SPD is protecting.

1.11 WARRANTY

- A. General Warranty: Special warranties specified in this article shall not deprive City of New York of other rights City of New York may have under other provisions of the Contract Documents and shall be

affiliated with the manufacturer. In addition, manufacturer shall provide certified test results for Short Circuit Fuse Testing, Surge Current Fuse Testing and Service Entrance SPD Tests as described in Section 1.06 Testing.

1.06 TESTING

- A. Surge Current Capacity.
 - 1. Single pulse surge current capacity: single pulse surge current tested in a mode at rated surge currents. Single pulse surge current capacities of 200,000 A or less per mode are established by single pulse testing in a mode.
 - 2. Single pulse surge current capacity test: an initial UL 1449 defined as 1.2 x 50 μ s, 6000V open circuit voltage waveform and an 8 x 20 μ s, 500A and 3kA short circuit current waveform is applied to benchmark the unit's suppression voltage.
 - 3. A single pulse surge of maximum rated surge current (for units rated over 200,000A per mode, components or sub-assemblies are tested) magnitude with an approximated 8 x 20 μ s waveform is then applied. To complete the test, another UL 1449 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage measured from the two UL1449 surges does not vary by more than 10%.
- B. Minimum Repetitive Surge Current Capacity.
 - 1. Service entrance suppressor units should be tested repetitively to verify repetitive capacity.
 - 2. Minimum Repetitive Surge Current Capacity Test:
 - a. An initial UL 1449 surge defined as 1.2 x 50 μ s, 6000V open circuit voltage waveform and an 8 x 20 μ s, 500A and 3kA short circuit current waveform is applied to benchmark the unit's suppression voltage.
 - b. A repetitive number of ANSI/IEEE C62.41.2-2002 (Category C3) surges defined as a 1.2 x 50 μ s 10kV or 20kV open circuit voltage waveform and an 8 x 20 μ s 10,000A short circuit current waveform are then applied at one minute intervals.
 - c. To complete the test, another UL 1449 surge shall be applied to verify the unit's survival.
 - 3. Survival is achieved if the suppression voltage measured from the two UL 1449 surges does not vary by more than 10%.
 - 4. Proof of such testing shall be the test log generated by the surge generator.
- C. Short Circuit Fuse Testing.
 - 1. Each design configuration shall be short circuit tested in accordance with the type of fusing utilized in the suppression path.
 - 2. Short Circuit Fuse Test:
 - a. Testing shall include application of a sustained overvoltage that causes the unit to enter a bolted fault condition.
 - b. This bolted fault condition shall occur with the full rated AIC current of the fuse available.
 - 3. The fuse shall fail in a safe manner with no physical or structural damage to the unit and any failure shall be self-contained within the unit.
- D. Surge Current Fuse Testing.
 - 1. Each design configuration shall be surge tested with fusing in series to verify that a transient of maximum surge current capacity magnitude is fully suppressed without fuse failure, operation or degradation.
- E. Service Entrance SPD must be subjected to a series of waveforms as described in IEEE C62.41.2-2002. Clamping voltage measurements were taken throughout the tests to evaluate any deviations in performance as a result of the surges. Injected surges included the 1.2/50 μ s, 8/20 μ s waveforms at levels of 6kV/500A for bench marking, and high current 10/1000 μ s surges at 1.5, 3.1, 3.6 and 6.2 kA levels.

SECTION 26 4313 - SURGE PROTECTION DEVICES (SPD)

PART 1.00 – GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting rigging, and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Provide transient voltage surge suppression system in accordance with the Contract Documents.

1.03 RELATED WORK

- A. Electric Service System as specified in Section 26 24 00.
- B. Electric Distribution System as specified in Section 26 24 16.
- C. Lightning Protection System – as specified in Section 26 41 00.

1.04 LISTING REQUIREMENTS

- A. UL 1449 Third Edition listed.

1.05 SUBMITTALS

- A. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection notes, wire size and wiring diagram.
- B. Equipment Manual: The manufacturer shall furnish an installation manual with installation notes, start-up and operating instructions for the specified SPD. Installation instructions shall clearly state whether the system requires an external overcurrent device to maintain the system's UL 1449 listing.
- C. Verification that all SPD are UL tested and labeled with 20kA, 8/20μs nominal discharge current rating for compliance to UL96A Lightning Protection Master Label and NFPA 780.

UL 1449 stipulation for fused SPD – The manufacturer's authorized representative is required to submit the following:

- 1. Certify that the SPD is UL 1449 listed (UL Card) with UL Card.
 - 2. Indicate the type of internal or external fusing that is incorporated in the SPD and what impact the fusing has on the performance of the device with respect to surge capacity and clamping levels.
- D. Manufacturer shall provide independent testing on repetitive capability and maximum surge current rating of service entrance suppressor units. This shall be performed at a nationally recognized lab not

2. Metal bodes of inductance located within six feet of a conductor or object with secondary bonds, shall be bonded with secondary cable and fittings. Typical of these are: roof flashings, parapet coping caps, gravel guards, isolated metal building panels or siding, roof drains, down spouts, roof insulation vents and any other sizeable miscellaneous metals, etc.

3.08 GROUNDING

- A. Grounding terminals shall be located at the base of the structure. Ground connections shall be made around the perimeter of the structure and in no case shall average over 60 feet apart. Ground terminals shall be driven to a minimum depth of 10' and more if necessary to reach permanent moisture. In case of rock ledge or other conditions making it impossible to comply with the above, trenching or a copper ground plate will be permitted; providing it will meet the Underwriters' Laboratories, Inc. requirements.

3.09 COMMON GROUNDING

- A. Provide necessary common grounds between the lightning protections system and the electric and telephone service entrance wires, TV and radio antenna grounds.

3.10 EXCAVATING

- A. All services involving excavating, trenching, back filling, tamping of ground for ground rods, test wells, and ground loops shall be furnished and completed by this contractor and meet the A/E requirements.

END OF SECTION

3.02 AIR TERMINALS

- A. The air terminals should be spaced so as not to exceed 20' apart around the outside perimeter of the roof or the ridge and not over 50 feet apart through the center of flat roof areas.

3.03 CONDUCTORS

- A. Conductors shall be installed in accordance with UL and NFPA requirements. A perimeter cable shall be installed around the entire main roof, and all penthouses and cooling towers. Each perimeter cable shall be connected to at least (2) down leads, providing a two-way path to ground from each air terminal. All center roof air terminals shall be interconnected with conductors to the outside perimeter cable. Conductors on the flat roof areas may be run exposed. Ground connections shall be made around the perimeter of each roof to the main down conductors at a maximum of 60'-0" on centers.
- B. All areas of flat roofs are to be cross run with this same size conductor cable so that no area larger than 50 feet by 150 feet remains unprotected. Mount points on cast copper bronze point bases and cable clips to the finished roof to avoid any roof penetrations.
- C. Avoid an upward direction for lateral conductors interconnecting air terminals. Turn conductors with a radius of at least 8 inches at an included angle not more acute than a right angle.

3.04 FASTENERS

- A. Conductor fasteners shall be spaced not to exceed 3'-0" centers. Masonry type cable fasteners spaced every 3'-0" on masonry. Adhesive type cable fasteners spaced every 3'-0" on flat roofs.

3.05 ROOF PENETRATIONS

- A. A thru the roof connector shall be installed where a conductor penetrates the roof, by the lighting protection sub-contractor. Copper pitch pans shall be furnished by this sub-contractor and installed by the roofing sub-contractor. Wood nailing blocks shall be furnished and installed by the general contractor. All patching and masonry work shall be furnished and installed by this contractor.

3.06 DOWN CONDUCTORS

- A. Provide system of down conductors concealed in structural columns or exterior walls. Each perimeter roof cable shall be connected to at least 2 down leads. The average distance between down leads shall not exceed 60'. Provide additional down conductors to provide a two-way path to ground from each air terminal. Each down conductor shall terminate in a ground rod in earth. Provide interconnecting bonding loop connecting all ground rods. Provide additional interconnecting bonding loop connecting all down conductors every 200 feet up the structure. Bond each down conductor to reinforcing steel and steel columns at their upper and lower extremities and every 200 feet up the structure.

3.07 INTERCONNECTION OF METALS

- A. All metal bodies within 6' feet of the conductor shall be bonded to the system with approved fittings and conductor. Connections between dissimilar metals shall be made with approved bimetallic connections.
 - 1. Bonding of all metallic objects and systems at roof levels and elsewhere on the structure shall be complete. Primary bonds for metal bodies of conductance shall be bonded with appropriate fittings and full-size conductor; and shall consist of, but not limited to the following: Roof exhaust fans, HVAC units with related piping, ductwork, exhaust vents and any other roof piping systems, cooling towers, and rail systems, window washing tracks, antenna mast for T.V. radio or microwave, flag poles, roof handrails and/or decorative screens, roof ladders, skylights, metal plumbing stacks, etc. Exterior architectural metal fascia and/or curtain walls or mullions which extend the full height of the structure shall also be bonded, if not inherently bonded thru the building frame.

2.02 AIR TERMINALS

- A. Air terminals shall be 1/2" X 18" solid copper (Nickel Plated) and shall extend at least 18 inches above the object to be protected. All air terminal bases shall be cast bronze with stainless steel bolt pressure cable connectors. Air terminals in the center roof area shall be 1/2" X 48" solid copper (Nickel Plated) with a proper base.
- B. Air terminal bases for flat roof areas shall be adhesive base to avoid roof penetrations. Provide spring mounted air terminals where required to allow for window cleaning equipment, etc.

2.03 CONDUCTORS

- A. U.L. Listed, 28 strands of 14 gauge copper wire weighing 375 lbs. per 1000 feet.
- B. Concealed conductors shall be installed in heavy wall rigid steel conduit. Bond conductor to each end of conduit with approved fittings.

2.04 FASTENERS

- A. Conductor fasteners shall be approved type of non-corrosive metal with sufficient strength to support conductors. Utilize adhesive type on flat roofs to avoid roof penetrations.

2.05 ROOF PENETRATIONS

- A. Provide thru roof connector where a conductor penetrates the roof. Connector shall be 1/2" stainless steel threaded rod equipped with necessary lead or neoprene washers and stainless steel nut for a water tight seal.
- B. Provide copper pitch pans for all roof penetrations for installation by roofing sub-contractor.

2.06 CABLE CONNECTORS

- A. All cable connectors shall be cast bronze with screw-pressure type stainless steel bolts and nuts.

2.07 GROUND TERMINALS

- A. Ground rods shall have rigid steel core with copper exterior layer. Copper weld minimum 3/4" X 10'-0".
- B. Four-wing copper ground plates shall be 3 1/2" X 18" - 20 gauge.

2.08 SURGE ARRESTERS

- A. As part of lightning protection system, this contractor shall furnish and install surge arresters on all incoming electric, telephone and cable systems, meeting the requirements of the Lightning Protection Institute and NFPA 780.

PART 3.00 - EXECUTION

3.01 TYPE OF SYSTEM

- A. Install conductors and complementary parts in a concealed system so completed work is unobtrusive and does not detract from appearance of the structure.

SECTION 26 4100 - LIGHTNING PROTECTION SYSTEM

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this Section, as shown and specified, shall be in accordance with the requirements of the Contract Documents.
- B. See Section 01 9113 for General Commissioning Requirements

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting, rigging and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to the following:
 - 1. Provide a master label lightning protection system in accordance with the Contract Documents.

1.03 RELATED WORK

- A. Excavation and backfilling in this division as specified in Section 26 05 00.
- B. See Section 01 9113 for General Commissioning Requirements.

1.04 QUALITY ASSURANCE

- A. Except as modified by governing codes and contract documents, comply with the applicable provisions and recommendations of the following:
 - 1. UL 96A, NFPA 780 and lightning protection institute standard LP1-175.
 - 2. Furnish Underwriters Master label.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and manufacturer's data for the following items:
 - 1. Provide detailed shop drawings showing the exact location of each item of lightning protection equipment, the routing of conductors, location of ground rods and items to be bonded into the system, etc. Shop drawing shall bear the certification of the Lightning Protection Institute prior to submittal.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

- A. Heary Brothers or approved equal of Approved Lightning Protection Company or Paxson.

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- E. Provide complete testing of the system in the presence of the Commissioner.
- F. Provide all required control wiring, to achieve specified operation, per requirements of New York City Electric Code Section 700.9 (D)(1).
- G. Power wiring to load bank shall be rated 150°C type SIS.
- H. This Contractor shall, under manufacturer's supervision, break down and reassemble as required the emergency generator to facilitate installation in building. Carefully check minimum dimensions and maximum weight to facilitate movement through building.

3.03 INSTRUCTION OF CITY OF NEW YORKS' PERSONNEL

- A. This contractor shall provide the services of the emergency generators manufacturers trained representative for a period of eight (8) hours to instruct the City of New Yorks' personnel on the operation and maintenance of the emergency generator and its engine.

3.04 ACCEPTANCE AND INSTALLATION TESTING

- A. This contractor shall provide all labor and materials to perform installation tests required by NYC Electrical Code, Section 700.4 (E). Tests shall be repeated until all defects are corrected and system successfully completes all tests. Provide certified copy of final test results to City of New York and applicable City agencies.

3.05 CONTROL WIRING

- A. All emergency generator control wiring from ATS switches to generator shall be 2 hour rated MI cable.

END OF SECTION

monitored by a single-phase voltage/frequency sensing device. If either parameter should deviate + 5% from normal for more than 3 seconds during the exercise period, the controller will terminate exercise, illuminate the "generator voltage/frequency failure" alarm light and horn, shut down both the engine generator and load bank following programmed cool-down, lock out to manual reset, and operate remote alarm contacts.

- c. Load Bank Cooling System: If over temperature should occur in the load bank, the controller will immediately terminate the exercise period, illuminate the "cooling failure" alarm light and horn, shut down the engine generator after programmed cool-down, attempt normal cool-down of the load bank and lock-out to manual reset. Provide auxiliary 120 volt 3 ampere contact SPDT for remote alarm of "Load Bank Overheat".
6. Upon completion of the exercise period, the controller opens the load bank contactors and remove load from the generator. The engine continues to run through field adjustable 5-30 minute cool-down time periods.
7. Upon completion of cool-down, engine is shut down and the controller resets to the next exercise period.
- b. Manual Operation:
 1. With the load controller mode switch in the "manual" position, the load bank can be applied to the generator by operation of the manual load step control switch(s). Engine start, cool-down and stop must be performed manually. The load bank protection system will operate; however, normal source voltage sensing and generator voltage/frequency sensing will be inoperative. Manual operation of the load bank will not interfere with the automatic exercise interval timer.
4. Provide remote alarm contacts [one (1) NO/NC pair, 120V, 10A per point] to indicate the following:
 - a. Generator being exercised by load bank controller.
 - b. Generator not being exercised by load bank controller.
5. Load bank controller shall be similar to Simplex Quatum Series.

PART 3.00 - EXECUTION

3.01 GROUNDING

- A. Provide service ground for emergency generator in accordance with code requirements for Non-Separately derived system.

3.02 EMERGENCY ELECTRICAL SYSTEM

- A. The emergency electrical generating system consists of a emergency natural gas - powered generator set and automatic transfer switches serving, legally required and optional standby loads. Transfer switches shall automatically signal the generator to start and energize the load should the normal service to the transfer switch fail. The emergency generator set shall also be manually exercised via a load bank.
- B. A housekeeping pad or pedestal foundation 6" high and extending 6" from all sides of the emergency generator set will be provided by others. Submit exact dimensions of required pad to general contractor.
- C. Isolate the generator at the base by means of combination spring and neoprene pad assembly.
- D. Provide all wire, lugs and/or cable required in rendering this emergency standby power operable.

7. All incoming power conductors shall be connected to main load bank bus terminals which all shall be 1000A/square inch copper with silver plated connection pads. The main terminals shall accept cables with ring lug terminations. Compression or set screw type terminals will not be accepted since the load bank is installed in a high vibration environment.
 8. Control Power: All control power shall be from the generator output. Control circuits shall operate at no more than 120V. Transformer isolation shall be provided when 120V is not available from generator output. All control circuits shall be fused.
 9. System Protection: The load bank shall include a system to protect against over temperature. The exhaust temperature sensor shall have a setting of 300°F and shall function to protect against restricted airflow and fan failure. The system shall be permissive, energize-to-run, fail-safe.
- G. Load Controller:
1. Controller shall provide automatic engine generator exercise. The controller shall perform the following functions.
 - a. Exercise interval timing.
 - b. Exercise duration timing.
 - c. Engine start-stop signal.
 - d. Engine generator stabilization delay.
 - e. Load application control.
 - f. Generator voltage/frequency performance monitoring.
 - g. Normal power failure sensing/generator overload protection.
 - h. Load bank cooling failure protection.
 - i. Engine and load bank cool-down delay.
 2. The controller shall be supplied in a NEMA 1 wall mounting enclosure, with manual controls and indicators, including:
 - a. Automatic/off/manual control switch.
 - b. Manual load application switch(s).
 - c. Load step energized indicator light(s).
 - d. Automatic exercise warning light.
 - e. Load bank cooling failure alarm light.
 - f. Generator voltage/frequency failure alarm light.
 - g. Lock-out reset pushbutton.
 - h. Alarm horn
 3. The load bank controller sequence of operation shall be as follows:
 - a. Automatic Operation:
 1. Exercise interval timer initiates exercise period. "Automatic Exercise" alarm light and horn activate for 15 seconds to alert operating personnel of impending engine start. The exercise interval timer is factory/field adjustable for day of week and time of day.
 2. Controller signals engine to start (requires that engine generator set be supplied with automatic engine start-stop control).
 3. Controller sense appearance of generator voltage and initiates 5-second time delay to permit voltage and frequency to stabilize, controller activates "generator voltage/frequency failure" alarm light and horn, shuts down engine, and locks out to manual reset. Provide auxiliary 120 volt, 3 ampere contact SPDT for remote alarm of "voltage/frequency failure".
 4. On successful completion of the stabilization time delay, the controller initiates the exercise duration timer and applies load to the generator. Exercise duration is factory/field adjustable, .3-16 hours. The controller shall follow a preprogrammed sequence of load application and removal for the duration of the exercise period. As each step is applied, its appropriate "load step energized" indicator light is illuminated.
 5. During the exercise period, the following are continuously monitored:
 - a. Normal Power: The controller provides 3 phase normal source voltage sensing, adjustable to 70% dropout, 90% pick-up. If voltage on any or all phases drops out of tolerance for more than 5 seconds, the controller will immediately disconnect the load bank from the generator, via load bank "step" contactors, this is a redundant function to the transfer switch opening the 1600A contactor. Reset to the next exercise period.
 - b. Generator Voltage/Frequency: Performance of the generator and engine governor is

- B. Installation: The load bank shall be installed within the air outflow of the engine radiator, and shall be cooled by the radiator airflow. The load bank shall be installed by bolted attachment to radiator; flex coupling to duct.
- C. Electrical Connection: The load bank power connection is 3 phase, 3 wire plus ground. The load bank remote control panel shall be installed near the generator switchgear to permit coordinated supervised operation. Power for the control panel will be from transformer isolated power supplies in the load bank. All connections to the panel shall be 120 volt, minimum 14-gauge wire. Control power for the load bank system shall be derived from the generator output.
- D. Load Bank Ratings:
1. Capacity: Maximum equal to generator set rating, minimum equal to 50% of generator set rating 1.0 power factor.
 2. Load Steps: Seven (7) equal increments.
 3. Voltage: As noted on drawings, 3 phase, 4 wire.
 4. Temperature Rise: 50°F maximum.
 5. Time Rating: Continuous.
- E. Operation:
1. The load bank shall be used for periodic, scheduled, supervised maintenance exercise of the standby system. Operation shall be automatic.
 2. The load bank system shall include terminals for insertion of N.C. control contacts from the automatic transfer switch. They shall act to instantaneously disconnect the load bank in the event of loss of utility power in order to prevent overloading of the generator if a transfer of the building load to the generator should occur.
 3. The system shall be able to manually control the load bank via switches on the load bank remote control panel which function to apply/remove load steps either individually or in programmed blocks.
 4. The system operator shall be able to monitor load bank performance via feedback indicator lights, which indicate operational mode, alarm and load applied.
- F. Load Bank Design:
1. General: The load bank shall be a completely self-contained unit which includes all resistive load elements, load control devices, load element branch circuit fuse protection, main load bus and terminals, control terminals, system protection devices and NEMA type enclosure.
 2. Enclosure: The load bank enclosure shall be NEMA 1 for indoor or NEMA 3R for outdoor. Enclosure shall be designed for permanent installation. Enclosure shall consist of an all-welded steel frame clad with removable side access panels. Control components shall be subpanel mounted and isolated from load elements and cooling air. Airflow through load elements shall be horizontal. Enclosure shall be fully degreased, phosphatized, primed and finish painted. Outdoor load banks shall include fixed air louvers. A perimeter flange shall be provided for attachment of air duct.
 3. Load elements shall be open wire, helically wound, chromium alloy. The resistance wire shall have a maximum continuous temperature rating of not less than 1920°F. The resistance wire shall be durated for use in the load bank such that the maximum continuous surface temperature of the elements does not exceed 1100°F. Each discrete single-phase resistor shall be a rigid, continuously supported assembly of resistance wire on a ceramic clad stainless steel rod. Resistor elements which are not rigidly and continuously supported and which, when broken, can short to adjacent conductors or to ground, shall not be permitted. The watt density of each discrete resistor unit shall not exceed 48 watts per square inch. Resistor shall be readily serviceable.
 4. Element Short Circuit Protection: The load bank shall include resistor short circuit protection consisting of one set of fuses per 50 KW branch circuit or per step, whichever is less. Fuses shall be current limiting type, 200,000 A.I.C., 600V. Fuses shall be Bussman type JJS, UL Class T. Fuses shall be installed in UL approved rejection type fuse holders.
 5. Load Step Control: One electrically held/electrically actuated magnetic contactor per each fused branch circuit.
 6. Load bank power wiring shall be 150°C insulated.

2. The ATS shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 1 ½ and 3 cycle, and 30 cycle ratings. ATSs which are not tested and labeled with 1 ½ and 3 cycle (any breaker) ratings and have specific breaker ratings only, are not acceptable.
- F. Tests and Certification
1. All production units shall be subjected to the following factory test:
 - a. The complete Automatic Transfer Switch shall be tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operation transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
 - b. The switch shall be subjected to a dielectric strength test per NEMA Standard ICS 1-109.21.
 2. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand current ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of submittal, shall be included in the certification.
- G. Tests and Certification
1. The complete ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation of the ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
 2. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
 3. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.
- H. Service Representation
1. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.
 2. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 3 years.
- I. Configuration and Manufacturer
1. The Automatic Transfer Switch system shall be supplied completely assembled in a NEMA Type 1 enclosure.
 2. The Automatic Transfer Switch manufacturer shall maintain a local service center capable of emergency service or routine preventive maintenance and shall offer preventive maintenance contracts. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 3 years.
 3. The Automatic Transfer Switch shall be an ASCO 4000 Series with Features as specified herein or approved equal of Russ electric.

2.05 GENERATOR LOAD BANK

- A. General: A radiator air-cooled, resistive load bank is required for permanent on-site installation as a component of a standby engine generator system. The load bank shall be used for scheduled, supervised maintenance exercise of the standby engine generator system. The load bank shall be designed for remote manual control.

3. Single-phase voltage sensing of the emergency source shall be provided, with a pickup adjustable from 85 to 100% (and dropout fixed at 84 to 86% of pickup), and frequency sensing with pickup adjustable from 90 to 100% (and dropout fixed at 87 to 89% of pickup). Both pickup settings shall be fully field-adjustable in 15 increments without the use of any tools, meters or power supplies. Repetitive accuracy of settings shall be $\pm 2\%$ or better over an operating temperature range of -20°C to 70°C . Factory set to pick up at 90% voltage and 95% frequency.
 4. The control module shall include four time delays that are fully field-adjustable in increments of at least 13 steps over the entire range as follows:
 - a. Time delay to override momentary normal source outages to delay all transfer switch and engine-starting signals. Adjustable from 0 to 6 seconds. Factory set at 1 second, unless indicated otherwise on the plans.
 - b. Transfer to emergency time delay. Adjustable for 0 to 5 minutes. Factory set at 0 minutes, unless indicated otherwise on the plans.
 - c. Retransfer to normal time delay. Time delay is automatically by-passed if emergency source fails and normal source is acceptable. Adjustable from 0 to 30 minutes. Factory set at 15 minutes, unless otherwise indicated on plans. Provide a toggle switch to manually bypass time delay on retransfer.
 - d. Unloaded running time delay for emergency engine generator cooldown. Adjustable for 0 to 60 minutes. Factory set at 5 minutes, unless indicated otherwise on the plans.
 5. A set of DPDT gold-flashed contacts rated 10 amps, 32VDC shall be provided for a low-voltage engine start signal when the normal sources fails. The start signal shall prevent dry cranking of the generator by requiring the generator to reach proper output, and to run for the duration of the cooldown setting regardless of whether the normal source restores before the load is transferred. Also provide the ability to select "commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.
 6. A momentary-type test switch shall be provided to simulate a normal source failure. Also, terminals for a remote contact which opens to signal the ATS to transfer to emergency and terminals for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal shall be provided.
 7. Output terminals to signal the actual availability of the normal and emergency sources, as determined by the voltage sensing pickup and dropout settings for each source, shall be provided.
 8. Engine Generator Exercise Timer: An engine generator exercising timer shall be built-in to the ATS control module and shall include a selector switch to select exercise with or without load transfer. The exerciser shall be solid-state for maximum reliability and minimum maintenance and shall be programmable to enable exercise for 1 minute to 24 hours per day (in 1-minute increments) for 0 to 7 days per week. Exercise settings shall be set by push-button and a digital display shall be provided to indicate settings. A replaceable, built-in battery shall be provided to enable the exerciser to continue to operate for up to two weeks without external power. A built-in battery charger shall extend battery life to at least five years. Loss of the battery shall not disable the exercise function as long as normal power is present.
 9. Inphase Monitor: An inphase monitor shall be built-in to the ATS and shall control transfer so that motor load inrush currents do not exceed normal starting currents, to avoid nuisance tripping of circuit breakers and possible mechanical damage to motor couplings. The inphase monitor shall operate without external control of electrical loads and without any external control of the power sources. The monitor shall compare the phase relationship and frequency difference between the normal and emergency sources and permit transfer the first time the sources are within 15 electrical degrees and only if transfer can be accomplished within 60 electrical degrees as determined by monitoring the frequency difference. Inphase transfer shall be accomplished if both sources are within 2 Hz of nominal frequency and 70% or more of nominal voltage.
 10. Each switch shall be furnished with an operators manual providing installation and operating instructions.
- E. Withstand Current Ratings
1. Shall be rated to close on and withstand the available rms systematical short-circuit current.

2.04 AUTOMATIC TRANSFER SWITCH

A. General

1. Furnish and install automatic transfer (and bypass-isolation) switch with poles. Amperage and voltage must not be less than as shown on the plans. Switches shall be the product of one manufacturer.
2. Neutral conductors shall be solidly connected. A neutral conductor terminal plate with fully-rated AL-CU pressure connectors shall be provided.

B. Mechanically-Held Transfer Switch

1. The transfer switch unit shall be electrically-operated and mechanically-held. The electrical operator shall be a single -solenoid mechanism, momentarily energized to minimize power consumption and heat generation. The operating transfer time shall be one-sixth (1/6) of a second or less.
 - a. The switch shall be positively locked and unaffected by voltage variations or momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life. The switch shall be mechanically interlocked to insure only one of two possible positions-normal or emergency.
2. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented blow-on construction for high withstand current capability and be protected by separate arcing contacts. ATS= utilizing components of molded-case circuit breakers, contactors, or parts thereof which have not been intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
3. Inspection of all contacts (movable and stationary), linkages and moving parts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handles shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout the entire travel to properly inspect and service the contacts when required.

C. Microprocessor Control Module

1. The control module shall direct the operation of the transfer switch. The modules sensing and logic shall be controlled by a built-in microprocessor. The control module shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the control module to be disconnected from the transfer switch for routine maintenance.
2. The control module shall be completely enclosed with a protective cover and be mounted separately from the transfer switch unit. Sensing and control logic shall be provided on plug-in printed circuit boards. Interfacing relays shall be identical to minimize the number of unique parts.
3. The control panel shall meet or exceed the voltage surge withstand capability in accordance with IEEE Standard 472-1974 (ANSI C37.90a1974) and the impulse withstand voltage test in accordance with the proposed NEMA Standard ICS 1-109.

D. Operation

1. Three-phase control modules shall be provided. Three-phase controls shall include a selector switch to enable temporary operation on single-phase power sources.
2. The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100% and dropout adjustable from 75 to 98% of pickup setting, both in increments of 1%, and shall be fully field-adjustable without the use of any tools, meters or power supplies. Repetitive accuracy of settings shall be $\pm 2\%$ or better over an operating temperature range of 20°C to 70°C. Factory set to pick up at 90% and drop out at 85%.

- H. Key lock sets shall be provided by the manufacturer. Door is to have restraint chain to prevent it from going past 100°. Doorframe is to have a "U" type drip cap, which will extend 6" beyond either side of door opening.
- I. The roof is to be of the bolt together panel type, constructed similar to side walls. The roof will have a full flashed roof opening for the exhaust pipe and vent. The roof shall be peaked to allow for proper drainage. A gasketed engine exhaust outlet shall be provided on the roof as a prevention against leakage into the enclosure. Provide rain flapper for exhaust silencer.
- J. All louver openings shall be full framed and flashed with "U" type drip caps, extending to 4" on either side of the opening with external full length rainhoods.
- K. The enclosure shall be designed to withstand wind loading of a minimum of 20-lb./sq. ft. without damage to the enclosure or roof system. In addition to the wind load, the roof is to be designed for snow loading of 40-lb./sq. ft. without buckling or deformation. The roof shall also support, without deformation, the weight of two (2) men, for normal maintenance or repair procedures. The roof shall also be peaked for proper drainage with appropriate gutters and leaders.
- L. The enclosure system shall be a walk-in type. The base shall be designed for six (6) point lifting. The floor shall be covered with minimum 7-gauge steel diamond plate decking. The enclosure shall remain structurally intact during normal transport and rigging, with no loss of shape or weather tightness. The enclosure base shall be furnished with I-beams sized and spaced as required.
- M. The louvers on the enclosure shall be motorized and arranged and designed to prevent leakage and shall be equipped with a motorized fan for proper cooling circulation. Louvers (intake and exhaust) shall be sized for operation at full load, at maximum ambient temperature with all doors closed. Louvers shall automatically open when the engine starts and close when the engine stops.
- N. The enclosure shall provide sound attenuation such that the following sound power levels are not exceeded at a distance of 3 feet:

Maximum Sound Power Level for Generator and Enclosure

Hz	63	25	250	500	1000	2000	4000	dBA
dB	107	101	96	94	93	91	90	97

Appropriate sound baffling and insulation shall be applied to achieve this designated sound level.

- O. Lube oil and radiator water drains with 1/2" bronze valves shall be provided and piped to outside of the enclosure. A crankcase fumes disposal line shall also be piped from the engine to the outside of the enclosure.
- P. Generator shall be provided with conduit entry boxes and copper bus stabs for ease of feeder access into the generator. Incorporate conduit window in the floor of the enclosure for feeder entry. Use flexible sealtite conduit for final connection to generator pull box with ground wire.
- Q. Factory installed emergency break-glass station shall be installed to shut the engine down in the event of an emergency situation. This item shall be located on the outside of the enclosure in an easily accessible and noticeable location.
- R. Generator load bank as specified in this section shall be mounted in generator housing.
- S. Finish with two coats of paint on primer.
- T. Fire resistant.
- U. Complete factory assembled and tested, shipped and installed as single unit.

1. Provide two (2) stations for each generator set, one (1) in the Engineering Office, the other as directed by City of New York, including all necessary Conduit and wiring for same. Provide the following alarm indicators per NFPA No. 110 and as specified herein. When actuated, these alarms shall sound audible alarms and indicate, by means of individual lights at annunciator panels, which particular malfunction is initiating the alarm. Provide 3/16-inch-high (minimum) labeling to identify the alarm. Provide a buzzer at each annunciator panel. Provide horn signal at set location.
2. Provide silencing (override) switch shall have flashing pilot lamp labeled "Override" to indicate that alarm is silenced. Provide power for alarm system from generator battery system. Alarm annunciators shall indicate the following malfunctions:
 - a. Remote Status Panel in Engineer's office:
 1. High water temperature
 2. Low water temperature
 3. Approach to high water temperature
 4. Low oil pressure
 5. High oil pressure
 6. Overspeed
 7. Cranking failure (after 60 seconds)
 8. Generator Output failure
 9. High and low battery alarm
 10. Transfer switch position lights (red and green)
 11. Generator overcurrent alarm

2.02 SPARE PARTS AND CABINET

- A. One complete set of filters.
- B. Battery and charger accessories.
- C. Two (2) sound attenuating headsets.
- D. Steel cabinet with key locked hinged front. Mount in generator housing.

2.03 GENERATOR HOUSING

- A. All panels shall be 4" thick. Panels are of a bolted together construction.
- B. All panel exterior surfaces, corners, floor deck plates, roof aprons, and all miscellaneous angles and fittings are to be 14-gauge aluminum.
- C. All interior perforated surfaces are to be 22-gauge aluminum.
- D. Each panel shall have full aluminum framing of 14 gauge and studs no more than 24" on center. Stiffened wall panels are not to exceed 24" in width.
- E. The panel cores are to be 100% filled with fireproof 3 1/2" thick mineral fiber sound absorbing material having a flame spread of 10 or less, with fuel contributing as 0 and smoke developed as 0.
- F. The enclosure shall have two prehung, full 2" thick, insulated soundproof doors, fully gasketed all around on all four (4) flanged edges. The door assembly is hung in a welded 4" thick modular frame assembly. The door leaf shall be of the same 14-gauge construction as the wall panels. The door shall have three (3) galvanized steel, solid 3/8" thick diameter, fast pin hinges. Hinges shall be considered as heavy duty industrial type for sever service. The door latches are to be chrome plated heavy duty steel, for sever service, and they are to have roller catches with adjustable striker plate.
- G. Door latch is to have interior steel plunger with mushroom cap panic hardware. Panic hardware is to have positive opening, regardless, if a security lock or pin has been placed through the latch hasps. Door latches, striker, and hinges are to be installed with tamper proof security hardware, which cannot be removed with standard hand tools.

- M. Fault Indicators:
1. Provide the following fault indicators:
 - a. Approach to high water temperature.
 - b. High water temperature.
 - c. Low water temperature.
 - d. Low oil pressure.
 - e. High oil pressure.
 - f. Overspeed.
 - g. Overcrank.
 - h. Main circuit breakers open.
 - i. High and low battery charge.
 - j. Generator overcurrent alarm
 2. Provide audible alarm (horn or bell) to sound continuously when any fault sensor trips and the bypass switch is inactive.
 3. Mount indicators and alarms in the control panel. Provide for manual reset.
 4. Terminate engine protection, annunciation wiring, and spare remote alarm contacts at a terminal strip or block that provides for interconnecting the engine protection system to the auto-start panel and remote annunciators.
 - a. Terminal strip enclosed in junction box.
 - b. Accessible location on electric set.
 - c. Terminals labeled to match corresponding terminal strips in auto-start control cabinet.
- N. Engine Labeling:
1. Provide a plate permanently affixed to rocker arm cover. List the following information:
 - Engine serial number
 - Engine model number
 - Optional equipment parts type number
 - a. Apply lettering by etching or other permanent technique.
 - b. The electric-set supplier and engine manufacturer are to retain a permanent record of the data contained on this plate.
- O. Electric-Set Finish:
1. Factory spray paint components of the emergency system (e.g., generator and base control panel, charger, battery rack, etc.) in a color as selected over a suitable primer.
- P. Remote Alarm Contacts:
1. Provide one (1) SPDT 120 volt 3-ampere spare contact unless otherwise noted below, in addition to contacts required for fault indicators and remote status panels, for each one of the following conditions for remote alarm annunciation:
 - a. High water temperature.
 - b. Low water temperature.
 - c. Approach to high water temperature.
 - d. Low oil pressure.
 - e. High oil pressure.
 - f. Overspeed.
 - g. Provide two (2) SPDT contacts for Cranking failure (after 60 seconds).
 - h. Generator output failure.
 - i. High and low battery alarm.
 - j. Two (2) contacts for transfer switch position (normal, emergency).
 - k. Three (3) contacts for engine selector switch position. (Auto, ON and OFF)
 - l. Provide two (2) SPDT contacts for Generator running.
 - m. Generator overcurrent alarm.
- Q. Remote Status Panels

2. Provide easy-to-read meter scales. Meters and switches to be labeled to indicate function.
 - a. Must be neat, attractive, easy to read, and permanent.
 - b. Lettering to be applied to panel face or to instrument or to permanently affixed plate.
 - c. Lettering to be applied by engraving, etching or other technique that will not rub off or wear off.
 - d. Fault indicators as specified elsewhere.
- J. Room Air Ventilation:
 1. Provide two (2) normally open contacts to operate the relay of the room air supply inlet louvers when the engine reaches self-sustaining firing speed.
 2. Wire the contacts to a terminal board in the control cabinet. Label terminals ILR-1 and ILR-2.
- K. Engine Exhaust System: Provide the electric-set supplied with exhaust manifold guard, exhaust silencer, flexible sections, exhaust piping, adapters, and connecting parts.
 1. Silencer:
 - a. Super critical silencing type as manufactured by Maxim, Nelson or Silex.
 - b. Bottom inlet and outlet horizontal type, drain cock at lowest point, one (1) accessible cleanout port. Finished in rust- preventive primer, heat-resistant paint, and completely insulated. Shall be size as recommended by engine manufacturer to accommodate exhaust piping run as indicated on mechanical drawings, and satisfy engine back pressure limits, with a 20% safety factor. Pressure drop thru muffler shall also not exceed 40% of allowable engine back pressure.
 2. Flexible Exhaust Pipe Section:
 - a. Flexible sections connected between the exhaust pipe and the engine exhaust manifold.
 - b. Stainless steel.
 - c. Smoketight.
 - d. Inside diameter same as exhaust pipe.
 - e. Provide flex section(s) to permit relative motion of engine and exhaust pipe up to one inch (2.5 centimeters) in any direction without strain on engine manifold or exhaust piping.
 3. Adapters and Connecting Parts:
 - a. Adapter required to connect silencer inlet to exhaust pipe.
 - b. Adapter required to connect silencer outlet to exhaust pipe.
 - c. Adapter required to connect flexible section to engine exhaust manifold outlet flange.
 - d. Adapter required to connect flexible section to exhaust pipe.
 - e. Bolts, nuts, lockwashers and gaskets required for adapters.
 4. Manifold Guard:
 - a. Provide metal guard to prevent personnel from contacting the engine exhaust manifold if manifolds are not water-cooled.
 - b. Rigid construction of open or expanded metal.
 5. Insulation: Insulate exhaust piping and silencer with 1800 F. type insulation. Surface temperature not to exceed 150 F.
- L. Fuel System:
 1. Engine Fuel System:
 - a. Provide clean dry natural gas to engine with supply pressure as specified in 2.01C.10.
 - b. Flexible fuel inlet line to engine shall be hard threaded pipe connection to base.
 2. Comply with chapter 28 of the NYC Building Code, the New York City Mechanical Code and The New York City Fire Code. Provide remote emergency breakglass station and fuel gas line solenoid valve to stop the flow of fuel to the engine. Locate Breakglass Station at entrance to emergency generator enclosure.

automatic test, manual start, and starting circuit "OFF" to prevent starting during maintenance. As depicted, the automatic test function shall permit the system to be tested manually, causing the auto-start control to react as if a power outage has occurred, starting the engine but not transferring the active load to the electric set.

5. Starting Performance:
 - a. The electric set shall be capable of assuming the active load in 10 seconds after loss of normal power.
 - b. Measure starting performance time specification as follows:
 - i. Measure time from loss of normal power to engine control contact closure in automatic transfer switch.
 - ii. Measure time from engine control contact closure in automatic transfer switch to transfer of load to emergency source.
- H. Control Cabinet:
 1. Cabinet: National Electrical Manufacturers Association enclosure; fully enclosed and louvered with lockable hinged door; entire unit free-standing.
 2. Main Circuit Breakers:
 - a. Line connected.
 - b. Oversized enclosure to ensure adequate space to terminate conductors without contacting sides of enclosure.
 - c. Manually operated switching with padlocking provisions.
 - d. Overcurrent protection: thermal magnetic, solid state or overcurrent relay to trip circuit breaker at 300% of generator full load current within 10 seconds.
 3. Neutral Ground Provision: Ground terminals to be provided inside cabinet.
 4. Instruments:
 - a. Voltmeter connected through selector switch to read line-to-line voltage, 1-2, 2-3, 3-1. Label selector switch to indicate meter connection at each position (i.e., 1-2, 2-3, 3-1). Red line at line-line voltage.
 - b. Ammeter connected through phase selector switch to three (3) individual current transformers to read phases one, two and three. Labeled selector switch to indicate meter connection to phase.
 - c. Frequency meter (dial type).
 - d. Ammeter, voltmeter and frequency meter shall provide 2% of full-scale accuracy.
 - e. Running time meter (electric or mechanical).
 - f. Voltage Adjusting Rheostat: Locate on face of control cabinet and labeled "Voltage Adjustment," with arrow labeled "Raise" and "Lower".
 - g. Locate engine speed adjuster on face of control cabinet or on face of control cabinet subbase and label "Engine Speed Control," with arrow labeled "Raise" or "Lower".
 - h. Oil pressure gauge in face of control cabinet or in face of control cabinet subbase.
 - i. Water temperature gauge adjacent to oil pressure gauge.
- I. Automatic Electric-Set Protection:
 1. Protection System: Provide power for sensors, trips, indicator lights, and alarm by engine cranking batteries. Provide fault sensors to cause emergency engine shutdown when any of the following faults occur:
 - a. High water temperature sensor set to trip at 205°F plus or minus 3°F, 96°C plus or minus 2°C.
 - b. Approach to high water temperature sensor set to pre-alarm at 190°F.
 - c. Low water temperature sensor set to trip at 80°F.
 - d. Overspeed sensor set to trip at 118 percent nominal revolutions per minute.
 - e. Low lube oil pressure sensor set to trip at the engine manufacturer's recommendation for lowest permissible oil pressure.
 - f. Overcrank sensor to trip after four (4) 60-second attempts to start.
 - g. Generator over current alarm.

operation. The radiator shall be equipped for a duct adapter flange. Airflow restriction from the radiator shall not exceed 0.5 inches (water) H2O. The contractor shall provide ductwork with flexible connecting sections between the radiator duct flange and exhaust damper.

2. Heating:
 - a. Provide a thermostatically controlled immersion type heater to ensure a minimum coolant temperature of 90°F in a room ambient of 32°F. The heater is to be suitable for operation with 120/208 volts single-phase alternating current emergency power. Provide matching disconnect switch.
- G. Starting System (Automatic)
 1. Cranking System:
 - a. Heavy-duty, long-life (6,000 hours) direct-current cranking motor(s) rated at 24 volts.
 - b. Engagement Mechanism:
 - i. Chamfered ring gear and pinion
 - ii. Self-lubricating pinion
 - iii. Electro-mechanical engagement
 - c. Enclosed motor and pinion engagement linkage.
 - d. Solenoid relay having contacts capable of carrying the maximum pinion-engagement solenoid current included in starting circuit between start contacts and the pinion-engagement solenoid.
 - e. Automatic cranking disconnect switch to disconnect battery charger during cranking.
 2. Battery Charger:
 - a. Provide as separate item a wall-mounted float-type full-static battery charger capable of recharging batteries to full potential within one (1) hour after a cranking cycle.
 - b. Input circuit protected with alternating current circuit breaker.
 - c. Output protected with fused disconnect.
 - d. Automatic alternating current line compensation.
 - e. Automatic overload (current limiting) protection.
 - f. Convenient switch to transfer from float charge to high-rate equalize charge.
 - g. Alternating current power failure relay.
 - h. Low direct-current voltage alarm relay with remote connections.
 - i. High direct-current voltage alarm relay with remote connections.
 - j. Adjustable to compensate for battery self-discharge rate during standby periods.
 - k. Provide minimum three (3) sets N.O./N.C. contacts for each alarm point.
 - l. Ammeter and voltmeter included in battery charger housing.
 - m. Single-phase, 110 volt alternating emergency current input.
 - n. Provision for wall mounting.
 - o. Terminate internal wiring at an accessible terminal strip inside the charger enclosure.
 - p. Furnish wiring diagram of charger internal circuitry.
 - q. Manufacturer: LaMarche Manufacturing Co., Kohler or equal.
 3. Batteries:
 - a. Provide Deep Cycle U.S.-made Absorbed Glass Mat (AGM) batteries capable of the following cranking cycle: cranking the set a minimum of four (4) times for 30 seconds each at firing speed and a room temperature of 32°F with 10 second rest between cranking periods. Provide a matching rack and cables of sufficient ampacities. Manufacturers: Nife, Inc., Exide.
 4. Starting System Operation
 - a. Provide the equipment, devices and material necessary to achieve automatic starting upon individual operation of any one engine control contact on automatic transfer switches, power switching, shutdown, and restore to normal standby condition; provide indicating lamp labeled "Overcrank Cutout" mounted in auto-start control panel.
 - b. In addition to the automatic starting function, the autostart control shall provide for

D. Generator:

1. Single-bearing alternator directly connected to engine through flexible coupling.
2. Rotating field, brushless type.
3. Drip-proof guarded.
4. Self-ventilated.
5. Self-lubricated bearings.
6. Generator to operate within National Electrical Manufacturers' Association temperature limits.
7. Generator rotor capable of operating at 25% overspeed.
8. Insulation conforming to Class F, National Electrical Manufacturers Association standards with a maximum of 80°C rise above ambient of 40°C when operated at its standby rated load of which (50%) consists of static rectifiers.
9. Provisions for grounding the neutral.
10. Positive ground between generator frame and base through mounting pads, between generator and engine, and between generator frames and external control cabinet.
11. Generator power connections located in oversized enclosure that is readily accessible for inspection. National Electrical Manufacturers Association standard telephone influence factor (TIF) 0.50 or less.
12. Waveform deviation factor less than 10% line-to-line.
13. Generator and regulator combination shall incorporate cross current compensation.
14. Voltage adjusting rheostat shall provide 5% voltage adjustment.
15. Static voltage build-up.
16. Rectifier type voltage regulator with silicon diode control.
17. Suppressors: Provide radio suppressions for both generator and exciter.

E. Vibration Isolation:

1. Support the electric-set on vibration isolators.
2. Vibration Isolators - Spring Type:
 - a. Number of Isolators: Sufficient number so that floor bearing pressure under each isolator is within floor loading permitted and load per isolator is not more than 75% of isolator load rating.
 - b. Attachment: Isolator bolted to housekeeping pad, electric-set base bolted to isolators.
 - c. Adjustments: Isolators adjustable for leveling and load distribution.
 - d. Spring mount assemblies to utilize bare springs with spring diameters not less than that of the loaded operating height of the spring and reverse deflection from operating height to solid height of 1/2". The mountings to provide a minimum static deflection of 1" and incorporate a ribbed or waffled neoprene pad.
 - e. Mounting to be one of the following, or as approved.

Type SLR	-	Mason Industries, Inc.
Type KW -		Vibration Eliminator Co.
Type AWR	-	Vibration Mountings & Controls Inc.

- f. Isolator Location: Equal number on each side of base, spaced for approximately equal load distribution per isolator. Drill electric-set base for isolator bolts.
 - g. Ship isolators loose with electric set.
 3. Flexible Connections:
 - a. Provide flexible connections between the electric set and exterior systems (such as fuel lines, electrical connections, and exhaust duct).

F. Engine Cooling and Heating:

1. Cooling:
 - a. Provide system capable of cooling the engine-generator unit, including the radiator duct-mounted load bank, at full load and 40°C ambient temperature. The engine cooling system shall be filled with a solution of 50% ethylene glycol.
 - b. Provide an engine-mounted radiator with a blower-type fan sized to maintain safe

- n. Upon cold start-up, voltage and frequency must stabilize within their specified bandwidths at approximately the same time (difference not to exceed 2 seconds).
- o. Generator shall be capable of supplying 300% of full load amps for 10 seconds.
- p. Voltage Regulator: A generator mounted volts-per-Hertz type regulator shall be provided to match the characteristics of the generator and engine. Its voltage regulation shall be within plus or minus 2% from no load to full rated load. Two voltage level adjustments shall be provided; the first one shall be mounted within the generator utilizing a screwdriver and crescent wrench adjustment (used for major adjustments) and the second adjustment shall be a panel-mounted rheostat used for finer voltage adjustments (+5% minimum). A voltage gain control to compensate for voltage drop caused by governor speed droop will also be provided as part of the regulator package. The solid state regulator module must be shock mounted and completely epoxy encapsulated for protection against vibration and atmospheric deterioration. The regulator shall be equipped with three phase sensing and inherent filtering to guard against SCR feedback from UPS systems. A permanent magnet exciter or a current boost system shall be supplied.
- q. Factory wire, for external electrical connections for the engine-generator set, to terminals in the engine-generator control panel, three (3) N.O./N.C. contacts per alarm point.
- r. Provide oversized generator winding terminal box to allow winding connection to indicated feeder without contacting enclosure sides.
- s. Provide main circuit breakers, as indicated on drawings, with short-circuit rating compatible with that of the generator. Provide custom oversized enclosure to allow specified feeder to be terminated on breakers without contacting enclosure sides. Enclosure may be field fabricated to suit actual conditions of top, bottom or side feeder entry.

C. Gas Engine:

- 1. Liquid cooled inline or Vee type, four-stroke-cycle design.
- 2. Spark ignited-ignition operation.
- 3. Capable of operating and achieving the specified performance with Natural Gas.
- 4. Self-lubricated, positive displacement, gear-driven lube oil pump.
- 5. Lube oil pump pressure-relief valve.
- 6. Pressure-lubricated main, connecting rod, piston pin, camshaft, and rocker arm bearings.
- 7. Full flow, engine-mounted, lube oil filter of the replaceable-element type, equipped with an automatic bypass valve.
- 8. Direct engine-mounted (no exposed oil lines) full-flow lube oil cooler with an automatic bypass valve.
- 9. Maximum allowable exhaust temperature at engine exhaust manifold outlet - 1,200°F.
- 10. Operate on maximum gas pressure of 5" to 20" in H2O.
- 11. No exposed fuel lines above 30 pounds per square inch pressure.
- 12. Provide an engine-mounted electric Solinoid valve for fuel shutoff, flexible fuel line and secondary fuel pressure regulator.
- 13. Governor: The engine governor shall be electronic Barber Coleman type. The governor shall maintain isochroous frequency regulation from no load to full rated load.
- 14. Standard Society of Automotive Engineers nuts, bolts and studs.
- 15. Automotive Engineers tubing and fittings.

A. General

1. Provide a factory-assembled, aligned, and tested gaseous fuel-powered engine generator set fully automatic on transfer and re-transfer and suitable for continuous operation for the duration of any interruption of the normal electric power source.
2. Only equipment from an authorized manufacturing and local warehousing distributor of a national diesel engine manufacturer will be considered. The supplier must be regularly engaged in the manufacture and installation of custom-designed electric power generating systems and have 24-hour service backup plus training facilities for customer personnel. Engine-Generator shall be as manufactured by Generac or approved equal and Caterpillar or Kohler.
3. Material and equipment shall comply with Diesel Engine Manufacturers Association.
4. Provide wiring and conduit to make the system complete, including that to remote devices, annunciators, and all controls.
5. Design materials and equipment furnished by the supplier to protect operating personnel from injury.
6. Unit shall be shipped as a ready-to-operate generator set with all components secured to a common base with suitable vibration isolators. (If unit is more than 22,000 pounds, ship generator separate and assemble in building.) If breakdown is required to facilitate installation at job site, engine manufacturer shall supervise, or their personnel shall perform breakdown and reassembly of unit as required to maintain warranty and guarantee requirements.

B. Capacity and Performance Requirements

1. Provide a generator set capable of successfully providing standby power to start in the following sequence and run continuously the following loads:
 - a. Electric set rating as indicated on drawings.
 - b. Nameplate KVA: 125 percent KW rating.
 - c. Power Factor: 0.8.
 - d. Steady state nominal frequency at rated Kilowatt 60 hertz. Manually adjustable from 59 to 62 hertz. Speed at nominal frequency of 1,800 revolutions per minute.
 - e. Steady state nominal line-to-line voltage at rated Kilowatts 120/208 volts. Manually adjustable plus or minus 5 percent of nominal voltage.
 - f. Power Distribution

Number of Phases:	Three (3)
Wires:	Four (4)
Phase Arrangement:	ABC

- g. Ambient Conditions: The set is to be capable of providing full-load kilowatts under ambient conditions of 100°F.
- h. Voltage Regulation: Not to exceed plus or minus 1% (difference in average voltage between no-load steady state and full-load steady state).
- i. Voltage steady-load bandwidth not to exceed plus 1/2%.
- j. Voltage Transient Performance:
 1. Dip: With step application of 0.8 power factor, full load not to exceed 20%.
 2. Rise: With step removal of 0.8 power factor, full load not to exceed 20%. With step application of 0.8 power factor, full load, not to exceed 15%.
 3. Recovery Time: Not to exceed 1.5 seconds.
- k. Frequency regulation (difference in average frequency between no-load steady state and full-load steady state).
 1. Adjustable from 0% to 3%.
 2. Adjusted at assembly to 0% isochronous.
- l. Frequency steady-load bandwidth not to exceed plus 1%.
- m. Frequency Transient Performance:
 1. Dip: With step application of 0.8 power factor full load not to exceed 6.5%.
 2. Rise: With step removal of 0.8 power factor, full load not to exceed 6.5%.
 3. Recovery Time: Not to exceed 1.5 seconds.

- b. Literature describing load bank and load bank control panel. Include Seismic Certification.
 - c. Sequence of operation of load bank control panel.
 - d. Complete control wiring diagrams.
 - e. Drawings giving exact location of remote alarm contact terminals.
 4. Furnish with shop drawings, written sequence of operation covering operation of the automatic transfer switch, emergency generator, and load bank for all functions (loss of normal power, retransfer to normal power, test, include operation of load bank and Engine/Generator fault indicators, etc.).
 - B. Maintenance Materials: Deliver to the City of New York at the Project Site the following quantities of items in size/color distribution as directed. Store in locations directed, in unopened containers and in a manner recommended by the manufacturer:
 1. Tools
 - a. Deliver to the City of New Yorks' representative all special tools required for proper operation and maintenance of the equipment provided. Submit comprehensive list of tools.
 2. Spare Parts
 - a. Provide one complete set of all fuel filters, oil filters, air filters, belts, and gasket set to accommodate all manufacturers recommended maintenance work up to and including one (1) year from acceptance of equipment.
 3. Maintenance Manual
 - a. Assemble from manufacturer a complete manual consisting of the Generator shop drawings. The manual shall also contain manufacturers operation and maintenance instructions, as well as manufacturers suggested spare parts list and list of special tools required. Upon approval of shop drawings provide five (5) copies to the A/E.
 - C. Pre-Installation Submittal
 1. Vendor for approved equipment, shall furnish to this contractor, based upon actual field conditions and distance measurements, the following:
 - a. Calculation and confirmation of, or recommendation of revised, diameter of exhaust gas piping and muffler selection to satisfy engine back pressure. Drop thru muffler shall not exceed manufacturers recommendations for gas velocity, and shall not exceed 40% of allowable engine back pressure.
 2. This contractor will obtain piping distance measurements from installation contractor and provide confirmation to proceed to installation contractor based on vendor's submission. Failure to follow this procedure shall make this contractor responsible for all costs associated with removal of piping installed, and installation of new. Provide copy of vendor's submission to Commissioner.
 - D. Acceptance Test. This contractor shall furnish to the Commission of Buildings a test report of the completed system upon installation. This report shall be prepared by a licensed professional, retained by the contractor. Test report shall be in a format acceptable to the Commissioner and in conformance to requirements of NFPA-110-2005, Section 7-13 and the New York City Electrical Code Section 700.4.

1.06 AGENCY APPROVALS

- A. Prior to installation of any work associated with the Emergency Power System, this Contractor shall prepare necessary drawings and pay fees for submission to applicable agencies including New York City Advisory Board. No work shall be installed without all required approvals.

PART 2.00 - PRODUCTS

2.01 EMERGENCY POWER GENERATORS

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and manufacturer' data for the following items:
1. Automatic Transfer Switches:
 - a. Submit shop drawings showing dimensioned outline and cross section, one line diagrams, wiring diagrams, nameplates with legends, and bill of material for approval prior to fabrication. Include complete schematic and connection diagrams including all field wiring between Automatic transfer switches, and Emergency Generator. Include Seismic Certification.
 - b. Drawings indicate minimum ampere capacity requirements of automatic transfer switches. Transfer switch withstand current rating shall be equal to either 1) or 2) below:
 1. Manufacturer listed rating with specific line side overcurrent devices;
 2. Transfer switch 30 cycle withstand rating shall be equal to or greater than the larger, line side AIC rating indicated on drawings for line side switchboard/panelboard, or largest calculated 3 phase fault current available at automatic transfer switch.
 - c. If using calculated available fault current, Contractor shall submit short circuit, Arc flash and coordination study specified in section 26 24 00 to determine required transfer switch rating, study shall be submitted and approved by Commissioner prior to ATS submission.
 - d. Increase ATS ampere rating as required to satisfy required transfer switch withstand current rating.
 - e. Submit documentation to demonstrate compliance and method of compliance with required withstand current rating.
 2. Emergency Generators: Furnish the following information on shop drawings:
 - a. Drawings of the gaseous generator set offered hereunder and its foundation requirements.
 - b. Literature describing the gaseous engine generator set and indicating its current production status.
 - c. Drawings and literature describing auxiliary equipment to be furnished.
 - d. Drawings of the Generator Terminal box/circuit breaker enclosure requiring field wiring. Indicate feeder entry points based upon field conditions and demonstrate adequate size to avoid contact between enclosure and conductors.
 - e. The following data in tabulated form: Make of engine Number of cylinders Bore, inches Engine displacement, cubic inches Piston speed, feet per minute to rated RPM Brake horsepower at rated kilowatt output Make and type of generator Number and type of bearings Exciter type
 1. Provide semi-schematic instrument panel drawings, which show relative placement of the various components within the control panel and the interconnecting wiring in addition to the normally required schematic (across-the-line) diagram. Provide drawings giving exact location of all remote alarm contact terminals.
 - f. Calculations to demonstrate proper sizing of batteries and battery charger in accordance with specified performance criteria.
 - g. Literature to show generator main overcurrent device will trip on generators output short circuit current within 10 seconds.
 - h. Scaled drawings and construction details of generator housing. Indicate location of all components located within housing.
 - i. Manufacturers Seismic Certification.
 - j. Calculations to demonstrate voltage dip will not exceed 15% with step application of loads indicated on drawings. Indicate type of starters used in calculations for all motor loads.
 3. Load Bank and Load Bank Control Panel: Furnish the following information on drawings:
 - a. Drawings of the load bank indicating mounting arrangement to generator set.

SECTION 26 3214 - EMERGENCY POWER SYSTEM GASEOUS TYPE ENGINE

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting rigging and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including but not limited to, the following:
 - 1. Emergency Generator, Load Bank, Transfer Switch(s) and Associated Control Systems.

1.03 RELATED WORK

- A. Equipment Supports and Nameplates are included in this division as specified in Section 26 05 00.
- B. Seismic Supports, restraints and Attachment are included in this division as specified in Section 26 05 48.
- C. Surge Protection devices are included in this division as specified in Section 26 43 13.

1.04 QUALITY ASSURANCE

- A. Comply with applicable Con Ed requirements.
- B. Manufacturers Instructions:
 - 1. In addition to the requirements of these specifications comply with manufacturers instructions and recommendations for all phase of work.
- C. Except as modified by governing codes and by the Contract Documents, comply with applicable provisions and recommendations of the following.
 - 1. Molded Case Circuit Breakers: Comply with Underwriters' Laboratories Standards UL 489.
 - 2. Emergency Generator: Diesel Engine Manufacturers Association.
 - 3. Automatic Transfer Switches: Comply with Underwriters Laboratories Standard UL 1008 and with NFPA-76A.
 - 4. Comply with New York City Building Code noise output limitations for exterior mechanical equipment contained in Section MC 926 and all applicable reference standards.

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3.05 TESTING

- A. Be available during tests of mechanical, miscellaneous equipment and elevator systems. Cooperate with all other contractors and make all electrical adjustments and changes required in the Work described above until equipment and systems are operating satisfactorily in the opinion of A/E.

3.06 GROUNDING

- A. Provide grounding in accordance with the New York City Electrical Code requirements, and as specified herein.
- B. Grounding of Motors: Bond grounding bushing on feeder conduit to ground log at starter and disconnect switch. Bond grounding bushing on feeder conduit and/or ground conductor to motor frame. If this is not feasible, extend ground conductor through an insulated bushed opening in the connection box and connect to motor base. Bond motor frame or base to metal piping or ductwork of system served by motor. Connection to piping or ductwork shall be accessible. Provide additional bonding jumper around any non-metallic fittings within 15'-0" of motor. Utilize Cadweld or approved equal listed compression type ground connections.
- C. Provide full size equipment ground conductor for each variable frequency drive and associated motor. Provide full size equipment ground to each elevator motor. Increase indicated conduit size to accommodate same.

END OF SECTION

B. Motor Power and Control Wiring

1. Install motor controllers where shown. Obtain the individual motor controllers, including approved manufacturers shop drawings, from the contractor who supplies them, and mount where shown on the plans. Check with other Contractors, Commissioner and approved shop drawings to make certain mounting location is correct and does not interfere with other equipment, and is in accordance with all manufacturer's requirements for mounting.
2. Ensure that motor rotation is correct and reconnect if necessary.
3. Provide motor feeder to starter and from starter to motor, including connections and wiring to and from disconnect switch. Support conduit feeder descending from ceiling on flanged floor fitting with conduit type fitting connecting to motor with 24-inch minimum of liquid-tight flexible steel conduit. All electrical field connections to motors and package machinery shall be made with liquid-tight flexible conduit.
4. Motor disconnect switches shall be mounted on adjacent wall or from the floor with unistrut supports. Switches shall not be mounted on fan housings.

3.02 MISCELLANEOUS EQUIPMENT CONNECTIONS

- A. All miscellaneous equipment will be provided under another Division; however, provide wiring for same, and make up all final electrical connections in accordance with manufacturer's recommendations. Where equipment in open areas is fed from wiring in the slab, terminate conduit in a flush coupling at the floor or suitable watertight box with telephone ell, from which point extend a rigid conduit nipple at least 8 inches above the floor, and provide flexible conduit connection to the equipment. Make all conduit connections at the floor watertight.
- B. Provide flexible metal conduit or Type "S" rubber cords, pigtails, caps, etc., to provide an operating system. Provide all flexible cords with a grounding conductor. Ground all equipment.
- C. See "OUTLETS" Section for mounting heights.
- D. Refer to all equipment manufacturer Shop Drawings for details of equipment connections. Provide receptacles to match the cord and plug on the equipment furnished.
- E. Provide a disconnect switch for all fixed appliances in accordance with Electrical Code.
- F. No extra will be granted contractor for removal of indicated receptacle and reinstallation of correct receptacle due to contractors failure to ascertain actual receptacle configuration requirements of equipment furnished prior to installation of receptacles.

3.03 ELEVATOR CONNECTIONS

- A. The elevators and associated equipment will be furnished, installed, and connected under a separate division of the specification. Provide disconnect switches and extend feeders from the disconnects to the equipment controllers. Provide (emergency) power outlets and disconnect switch for the control of each car fan and lights and for lights and receptacles in elevator shaft and in machine room where directed. Provide a receptacle, switch, and light for service at the bottom of each elevator pit. Provide empty conduits as called for in elevator specifications. Provide necessary equipment and wiring in conjunction with the elevator operation under power failures and fire conditions.

3.04 FIRE PUMP

- A. The fire pump feeders, normal and emergency, shall be run in slab with minimum 2" concrete cover, or encased by minimum 2" of concrete except that it may be exposed in fire pump room and in electric service room. Conduit shall be heavy wall rigid steel.

3. Enclosure: National Electrical Manufacturers Association I with multiple knockouts on all sides and back, hinged door, and cover interlock which prevents door opening when switch is in ON position. Provide triple padlocking capability. Utilize National Electrical Manufacturers Association 3R (rain-tight) enclosure for exterior. Provide nameplate on each disconnect switch denoting equipment served.
4. Size, fusing and number of poles as shown on plans or as required by code for motor installed. Provide horsepower rated switch to match motor load if no size is shown. Use 3-pole plus solid neutral switches unless otherwise noted. Provide where indicated and where required by code.
5. Provide a ground lug, O.Z. Gedney type "KG" or equal for each disconnect and mount to enclosure.
6. Approved Manufacturers: Square D, or approved equal of Siemens or Cutler-Hammer.

2.02 MANUAL MOTOR STARTERS (Thermal Switch)

- A. Provide each motor below ½ horsepower with a manual motor starter as indicated on drawings.
 1. Starters shall have quick-make, quick-break toggle mechanism. Starter shall be suitable for 120 volts, 120/208 volts or 277 volts as required by indicated circuiting. Overload shall have field adjustment allowing up to ±10% variation in ratings at nominal heater value. Cutler Hammer MSTOI for single pole and MSTO2 for two pole application, or approved equal.
 2. The Contractor shall obtain full load current data from approved shop drawings and furnish and install appropriate plug-in heater unit in accordance with manufacturer's recommendations.
 3. Enclosure: NEMA 1 enclosures with knockouts. Cutler Hammer MSTOISN for surface mounting or MSTOIDN cover for flush mounting. Provide nameplate for each starter indicating equipment served. Provide NEMA 4 enclosure for outdoor application or where indicated to be weatherproof, Cutler Hammer MSTOIAH, or approved equal of Square D or G.E..

2.03 NAMEPLATES

- A. Engraved nameplates shall be furnished for disconnect switches. Nameplates shall give load served, item designation and feeder and conduit sizes as well as fuse class and ampere rating.

PART 3.00 – EXECUTION

3.01 MOTOR POWER AND CONTROL WIRING

- A. General:
 1. Provide all motor power wiring, for both large and fractional HP motors, unless otherwise noted.
 2. Install and wire all control devices that are part of the motor power circuit.
 3. The requirements of this Section are applicable to all other power consuming devices.
 4. Provide all control wiring for fan shutdown via smoke detection. Control wiring for fan shutdown and smoke purge functions shall be terminated in starters and/or control panels per approved control wiring diagrams furnished by mechanical contractor.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and manufacturers data for the following items:
 - 1. All disconnect switches.
 - 2. All motor controllers.
- B. Test Reports
 - 1. All motor control centers specified by this section shall be given a 60 Hz A.C., dielectric test. Dielectric test shall be phase to phase, and phase to ground, at twice rated voltage plus 1,000 volts, but not less than 1,500 volts, for one (1) minute, prior to shipment from factory. A test voltage which is 20% higher than that in the one minute test. The date of the test and the name and title of the individual certifying the test shall be clearly shown on a label affixed to the equipment.
- C. Maintenance Materials: Deliver to the City of New York at the Project Site the following quantities of items in size/color distribution as directed. Store in locations directed, in unopened containers and in a manner recommended by the manufacturer.
 - 1. Tools
 - a. Deliver to the City of New Yorks representative all special tools required for proper operation and maintenance of the equipment provided. Submit comprehensive list of tools.

1.06 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 to the approval of the A/E and at no additional cost to the City of New York.

PART 2.00 – PRODUCTS

2.01 DISCONNECT SWITCHES

- A. Provide for each motor 1/2 horsepower and above, a rated disconnect switch.
 - 1. Heavy-duty, single-throw knife switch with quick-make, quick-break mechanism, capable of full load operations. Horsepower rated and meeting National Electrical Manufacturers Association and U.S. Government Specifications for Class A switches.
 - 2. Provide with contact arc-quenching devices, such as magnetic blowouts or snuffing plates. Provide self-aligning switchblades with silver alloy contact areas, designed so that arcing upon making and breaking does not occur on the final contact surfaces. Provide with high pressure, spring loaded contact. Mount switch parts on high grade insulating base. For disconnect switches serving hydraulic elevators provide one N.O. and one N.C. auxiliary contact rated for 10 Amperes Continuous.

SECTION 26 2923 - ELECTRICAL POWER EQUIPMENT

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Disconnect switches.
 - 2. Manual motor starters.
 - 3. Power wiring to devices.
 - 4. Control wiring as indicated on contract documents or called for herein.

1.03 RELATED WORK

- A. Equipment supports and nameplates are included in this division as specified in Section 26 05 00.
- B. Basic materials and methods are included in this division as specified in Section 26 05 19.
- C. Surge Protection devices are included in this division as specified in Section 26 43 13 for Motor Control Centers.
- D. Seismic Supports, Restraints and Attachment are included in this division Section 26 05 48.
- E. Fuses for fused disconnect switches are included in this division as specified in Section 26 24 00.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Instructions:
 - 1. In addition to the requirements of these Specifications, comply with manufacturer's instructions and recommendations for all phases of work including installation of equipment furnished by others.
- B. Except as modified by governing codes and the Contract Documents, comply with the applicable provisions and recommendations of the following:
 - 1. Disconnect Switches: Comply with National Electrical Manufacturer's Association Standard KS-1, Federal Standard W-S-865C, U.L.98, and U.L. 50.
 - 2. Motor Controllers: Comply with Underwriters' Laboratories' Standard UL-508, and National Electrical Manufacturers' Association Standard ICS-2.

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2. Include on directory, the panel identification, the cable and conduit size of panel feeder, and the feeder origination point.
3. In addition to identification nameplates described elsewhere, where current breakers or fuses are applied in compliance with listed series combination ratings, the supply feeder overcurrent device and the load equipment (panelboard, distribution panel, MCC, etc.) shall have an additional nameplate with marking: CAUTION. SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

C. Grounding

1. Bond grounding bushing on feeder conduit to ground lug (ground bus where specified) in panel with a copper ground conductor. Ground conductor shall be sized as follows:

<u>Feeder</u>	<u>Required Ground Conductor</u>
Up to 1/0	#6
2/0 - 3/0	#4
4/0 - 350 MCM	#2
500 - 600 MCM	1/0

2. Tie all branch circuit grounding bushings together by running a copper ground conductor through them and connecting to the panel grounding lug (ground bus where provided). Grounding conductor shall be sized as follows: based upon largest branch circuit.

<u>Branch Circuit</u>	<u>Required Ground Conductor</u>
Up to #2	#8
#1 thru 1/0	#6
2/0 thru 3/0	#4
4/0 thru 350 MCM	#2
500 thru 600 MCM	1/0

- D. Permanently affix Arc flash label based upon specified short circuit, Arc flash hazard, and Coordination Study.

3.02 CONTACTORS

- A. Install in accordance with manufacturers installation instructions and these specifications.

3.03 GROUNDING

- A. Provide grounding in accordance with the New York Electrical Code requirements, and as noted on drawings and described elsewhere in specifications.

END OF SECTION

3. Interrupting capacities: Six (6) times rated current.
 4. No derating required for use on high inrush loads.
 5. Current coil magnetic blowouts on all poles.
 6. Solderless lugs. All terminations shall be suitable for minimum 75°C wire.
 7. Provide sufficient poles to operate on system as indicated.
 8. Provide two (2) auxiliary contacts, field reversible.
- B. Construction:
1. Pressure assembled electromagnets of laminated low-loss electric steel.
 2. Machine-ground pole faces and shading coils for minimum alternating current hum level.
 3. Current coil magnetic blowouts on all poles to insure high interrupting capacity with minimum contact erosion.
 4. Self-cleaning, self-aligning contacts and including adjustable contact action and pressure.
 5. Silver tungsten contact materials.
- C. Operation:
1. Contactor coils close the contacts at minimum of 85% of normal voltage and withstand 10% over-voltage without damage to coil windings. Provide all contractors as alternate current coil operated or supplied with appropriate power supply. Provide all supplementary relays which are required to properly interface with control devices. Coil voltage as indicated by circuiting on drawings. Provide with auxiliary relay, or interface control module, for 2-Wire control where drawings indicate control via single pole toggle switch in lieu of momentary contact switch.
- D. Enclosure:
1. NEMA 1 cabinet for surface mounting, front connected with flush dead back construction. Arrange contacts to be renewable from front of panel. Panel or switchboard mount when so indicated.
- E. Momentary contract, remote control switches for operating contactors: ASCO Cat. #173A2 (Flush Mount), #173A3 (Surface Mount) or approved equal.
- F. Manufacturers:
1. Automatic Switch Co. #911 (225-1000 amperes), #920 (30-225 amperes), #1255-166 (30 amperes); #918 (20 amperes or less) or equal of Siemens, Westinghouse, or Square D.

PART 3.00 – EXECUTION

3.01 PANELBOARDS

- A. Installation:
1. Install in accordance with manufacturers installation instructions and these specifications.
 2. Mount Panel 4 feet to panel center but with maximum height of six (6) feet six (6) inches to handle of topmost switching device.
 3. Mount surface type panels 1/4" off wall.
 4. Where feeder cable supplying the mains of a panel are carried thru its box, or where two (2) section panel is furnished with main circuit breakers in each section; connect panels to main feeder by insulated parallel gutter taps (O.Z. Electrical Manufacturing Company – Type XTP with XTPC cover, or approved equal by Burndy or Dossert). Full size tap for two panels on a common feeder, half the main cable capacity for three or more panels per feeder.
 5. Neatly arrange branch circuit wires and tie together in each gutter with waxed twine or Thomas & Betts nylon "Ty-Raps", or approved equal at minimum intervals.
 6. Plug all knockouts removed and not utilized.
- B. Indexing and Identification:
1. After installations are complete, provide and mount under sturdy transparent shield in the directory frame of each panel door, a neat, accurate and carefully typed directory properly identifying the lighting, receptacles, outlets and equipment each branch circuit breaker controls.

4. Provide Arc-fault circuit Interrupter type C.B. (1 pole) for all 120 volt branch circuits supplying 15 or 20 Ampere, 125 volt, single phase outlets, including lighting, receptacle, motor, and miscellaneous loads located in dormitory areas.
- e. Provide main breakers in sections of multi-section panels and when two (2) or more panels are served by a common conductor or over-current device.
- f. Panelboards shall be labeled with UL listed, series, short circuit rating. Series rating shall cover all trip ratings of installed frames. It shall state conditions of UL series rating including:
 1. Size and type of upstream device.
 2. Branch devices which can be used.
 3. UL listed rating.
- g. Panelboards shall be Eaton Pow-R-Line Type, as modified by these specifications or approved equal of GE or Siemens.

2.02 FUSIBLE PANELBOARDS

- A. Provide fusible panelboards consisting of an assembly of branch circuit switching and protective devices mounted inside a dead front enclosure. Provide the number and size of branch circuit devices as indicated on the drawings.
- B. Main bus current capacity shall be sized according to feeder switch size. Bus shall be copper, sized to limit maximum temperature rise to 50°C above 40°C ambient, when conducting 100% of rated current, or as required by local code whichever is more stringent.
- C. Bus Bracing: 100,000 ampere (Root Mean Square) continuous symmetrical short circuit current, unless otherwise noted on drawings.
- D. All bus connections shall be made with two bolts or more.
- E. The switch to bus connector links shall have current-carrying capacity equal to the maximum rating of the switch.
- F. Switches shall be quick-make, quick-break type.
- G. Fuseholders shall be of the high pressure type using a compression coil spring.
- H. All switches shall be provided with an operating handle which can be triple padlocked in the "OFF" position.
 1. A cover interlock shall prevent opening the switch door unless in the "OFF" position.
 2. All switches shall be heavy duty type, horsepower rated.
 3. All wire terminations shall be rated for minimum 75°C wire.
- I. Enclosure:
 1. Code gauge steel box galvanized.
 2. Weld a ground connector (O.Z. Type QGL) to inside of box for all panels not provided with a separate equipment ground conductor. For panels served by a separate equipment ground conductor, provide ground bus bonded to enclosure with terminals for all ground wire.
 3. Surface mounted.
 4. Front shall be heavy code gauge steel as required to maintain panel face flat. Hinged door in door construction, or hinged side gutters. Front shall be primed and a finish coat of gray ANSI 61 paint applied.
 5. Siemens Sentron Type F1 or F2 as modified by these specifications.
 6. Oversize enclosure as required to accommodate sub-metering C.T.'s.
- J. Manufacturer: Siemens or approved equal of GE or Eaton.

2.03 CONTACTORS

- A. Ratings and Features:
 1. Mechanically held, opened and closed by electrical impulse to coils.
 2. Rated to amperes for all classes of loads to 600 volts alternate current.

3. To obtain required A.I.C. capacities, panel branch and main circuit breakers shall be fully rated. Where permitted by Code, Contractor may utilize a U.L. listed series rating with the upstream overcurrent device protecting the panel feeder, equal to or greater than the required A.I.C. When U.L. listed series ratings with indicated upstream overcurrent device protecting the panel feeder are not permitted by Code, or do not meet the requirements specified on the drawings, contractor shall furnish a fully rated panel, or current limiting Main Circuit breaker in the panel and branch breakers which have a U.L. listed series A.I.C. which meets or exceeds the requirements. Minimum AIC shall be as follows:
 - a. No 120/208 volt C.B. shall be rated less than 10,000 AIC.
 - b. Panels whose feeders are protected with fused overcurrent device.

	Lighting Panel	Power Panel
120/208	200,000 AIC up to 100A, Fuse 100,000 AIC over 100A Fuse	100,000 AIC
265/460	50,000 AIC	100,000 AIC

- c. Panels requiring main circuit breakers of the current limiting type, as noted on panel schedules or elsewhere in this specification shall have main breakers as follows in lieu of those specified under Item 2, above.
 1. Circuit breakers shall be equal to Eaton Current Limit -R- type and shall be current limiting, or equal of Square D or Siemens.
 2. Breakers 100 ampere frame shall be thermal magnetic trip with inverse time current characteristics. Breakers 400 amp and 250 ampere frame shall be solid-state trip complete with built in current transformers solid-state trip unit and flux transfer shunt trip. Breakers shall have easily changed trip rating plugs with trip ratings as indicated on the drawings. Rating plugs shall be interlocked so they are not interchangeable between frames and interlocked such that the breaker cannot be latched with rating plug removed. In lieu of rating plugs, 20%-100% adjustable continuous current rating is acceptable. Adjustment screw shall be concealed. Breakers shall have built in test points for testing long delay and instantaneous and ground fault (where applicable) functions of the breaker by means of 120 volt operated test kit.
- d. Current limiting circuit breakers shall protect all molded case breakers down stream as shown on the drawings. No deviations from this provision shall be acceptable. Manufacturer shall submit copy of UL series rated listing with downstream device, proving the protection, from both peak currents and I squared T energy. Utilize breakers providing the following UL Series listed short circuit ratings.

Main C.B. Trip

Short Circuit Rating

120/208 Volt
Lighting Panel

Up to 250 A 200,000 AIC

120/208 Volt
Power Panel

Up to 400 A 200,000 AIC

1. For lighting circuits controlled at panel, provide C.B.'s rated for switching load controlled i.e. fluorescent, HID etc.
2. Provide personal ground fault protection type C.B. (1 or 2 pole - 5 ma type) where required by code or called for on drawings.
3. Provide equipment ground fault protection type C.B. (30 ma Type) where required by code or called for on drawings and for all pipe trace heating systems.

5. Sub feed lugs. Provide for all two (2) section panels with no main circuit breaker to facilitate connection to second section.
 6. Integral remote control switches, and contactors.
 7. Surge Protection Devices.
- C. Panelboard Interior:
1. Rigid removable assembly of copper bus bars and interchangeable bolted branch circuit devices. Bus current rating shall be determined by heat rise test conducted in accordance with UL 67, or as required by applicable code whichever is more stringent.
 2. Bus bars drilled to permit branch circuit devices of all sizes and number of poles to be interchangeable and installed in any spare space of sufficient size, without disturbing adjacent units, removing main bus or branch circuit connectors, and without machining, drilling or tapping.
 3. Arrange bus in sequence or distributed phasing so that multipole circuit breakers can replace any group of single pole circuit breakers of the same size.
 4. Main bus current capacity shall be sized according to feeder switch size or panel main C.B. frame size where applicable.
 5. Provide full size ground and neutral buses unless otherwise noted on drawings in each panel. Provide isolated ground bus and 200% rated neutral bus as noted on drawings.
- D. Enclosure:
1. Code gauge steel box galvanized.
 2. Weld a ground connector (O.Z. QGL) to inside of box, for all panels with isolated ground bus or no ground bus.
 3. Flush mounted in finished areas and where indicated. Surface mounted elsewhere.
 4. 20 inches wide minimum. Provide gutter space in accordance with applicable codes. Where feeder cable supplying the mains of a panel are carried thru its box, or where two (2) section panels are furnished with main circuit breakers in each section, the box shall be sized to provide the additional required wiring space for feeder and feeder tap to panel.
- E. Front:
1. Heavy code gauge steel as required to maintain panel face flat. Hinged door in door construction. Power panels may have hinged side gutters to provide access to interior in lieu of door in door construction. Doors shall have flush type cylinder lock. Front shall be cleaned, primed, and a finish coat of gray ANSI 61 paint applied.
- F. Terminal Lugs:
1. Locate main lugs properly at top or bottom, depending on where main feeder enters. Terminations shall be approved for 75°C rated wire.
- G. Circuit Breaker Overcurrent Devices:
1. Plastic molded case. Completely sealed enclosure. Toggle type operating handle. Trip ampere rating and ON/OFF indication clearly visible. Tested and labeled per UL-489.
 2. Silver alloy contacts with auxiliary arc-quenching devices.
 3. Bolt in place to main bus.
 4. Bolted type terminals Underwriters' Laboratories approved for copper conductors.
 5. 100 A to 400 A frame circuit breakers shall be thermal-magnetic trip-free, trip-indicating, quick-make, quick-break, with inverse time delay characteristics. Single handle and common tripping multiple breakers.
 - a. Locate next to each breaker or space unit an individual number button. Where multiple-section panelboards occur, no two sections are to have like numbers.
 - b. All circuit breakers shall be HACR listed and capable of being padlocked in the "OFF" position. Provisions for locking shall not be removable when the lock is removed.
- H. Minimum Frame and Electrical Panel Ratings:
1. Minimum Frame Size shall be 100 Amperes.
 2. Circuit breaker interrupting capacity shall be as indicated on drawings, if no indication on drawings minimum shall be as specified herein.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and manufacturers' data for the following items:
1. Panelboards:
 - a. Show main devices and lug sizes; branch circuit device sizes and arrangement; bus ampacities; dimensions and construction; gutter dimensions; protective coating; and all pertinent details of panel, enclosure, cover, and method of securing cover and lock.
 - b. Nameplates, as specified in Section 26 05 00, paragraph 3.12 Identification.
 - c. Panel directory.
 - d. Short Circuit Ratings: Indicate device short circuit ratings, indicate UL listed series ratings with integral or remote upstream overcurrent device. Indicate all bus short circuit bracing.
 - e. Prepare printed table for each panel for approval by Commissioner, listing trip rating, and frame/switch rating, of each overcurrent device including main device if applicable. Also list device and panel U.L. listed short circuit rating, including series ratings with integral or remote upstream device.
 2. Dry Type Transformers: Dimensions, nameplate, and catalogue data.
 3. Contactors: Dimensions, catalogue data, number of poles, coil voltage and contact ratings.
- B. Test Reports. Submit certified test reports showing compliance of the following items in accordance with the contract documents.
1. All panelboards specified by this section shall be given a 60 Hz A.C., dielectric test. Dielectric test shall be phase to phase, and phase to ground, at twice rated voltage plus 1000 volts, but not less than 1500 volts, for one (1) minute, prior to shipment from factory. A test voltage which is 20% higher than that in the one minute test may be applied for one (1) second as an alternative to the one (1) minute test. The date of the test and the name and title of the individual certifying the test shall be clearly shown on a label affixed to the equipment.
- C. Maintenance Materials
1. Manufacturer shall supply installation instructions and NEMA Standard PB1.1.

PART 2.00 - PRODUCTS

2.01 LIGHTING AND POWER PANELS (CIRCUIT BREAKER TYPE)

- A. Provide panels consisting of an assembly of branch circuit switching and protective devices mounted inside a dead front enclosure. Provide the number and size of these branch circuit devices as indicated on drawings.
- B. Provide the following modifications and additional equipment as shown on the drawings or called for in specifications:
1. Main circuit breakers.
 2. Split buses.
 3. Subfeed switches.
 4. Feed-through lugs. Provide for all two (2) section panels with one (1) main circuit breaker to facilitate connection to second section.

SECTION 26 2416 - ELECTRICAL DISTRIBUTION SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting rigging and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Provide electrical distribution system in accordance with the Contract Documents.

1.03 RELATED WORK

- A. Equipment Supports and nameplates are included in this division as specified in Section 26 05 00.
- B. Fuses for fusible power panels are included in this division as specified in Section 26 24 00.
- C. Surge Protection devices are included on this division as specified in Section 26 43 13.
- D. Short circuit, Arc flash hazard and Coordination Study is included in this division as specified in section 26 24 00.
- E. Seismic Supports, restraints and Attachment as specified in Section 26 05 48.

1.04 QUALITY ASSURANCE

- A. Manufacturers Instructions:
 - 1. In addition to the requirements of the specifications comply with manufacturers instructions and recommendations for all phases of work.
- B. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions of the New York City Electrical Code, and recommendations of the following:
 - 1. Panelboards: Comply with latest versions of, Underwriters Laboratories Standards UL 50 for cabinets and boxes, UL 67 for panelboards, and UL 98 for enclosed and Dead front switches. National Electrical Manufacturer's Association Standard PB-1, PB-1.1 and KS1 for enclosed distribution switches; and Federal Specifications W-P-115C.
 - 2. Circuit Breakers: Comply with latest versions of, Underwriters' Laboratories Standards UL-489, and National Electrical Manufacturers' Association Standard AB-3, and Federal Specifications W-C-375B, and IEC 157-1.
 - 3. Contactors: Comply with Underwriters Laboratories standards UL 508.
 - 4. Fusible switches: Federal Specification W-C-865C.

the water pipe so as to ground the conduit enclosing as well as the conductor. Bond cold water pipe system to separate grounding electrodes, per Code requirements.

- C. Provide two (2) ground rods or four wing type grounding plates and connect to service ground by grounding electrode conductor. Ground terminals shall be spaced minimum 8'-0" apart. Contractor may delete one (1) ground terminal if a maximum resistance of 5 ohms to ground with a single ground terminal can be demonstrated.
- D. Structural steel which is not intentionally grounded shall be bonded to the grounded conductor at the service equipment as required by code. Point of the attachment to building steel shall be accessible.
- E. Lightning protection system ground terminals shall be bonded to the grounding electrode system.
- F. Provide grounding type bushings for feeder conduits which originate from the service switchboards and individually bond this raceway to the ground bus in the main switchboards.
- G. Connect the neutral bus in the main service switchboards to the ground bus by means of removable link.
- H. Provide service grounding for dry-type transformer secondaries.
- I. Provide service ground for emergency generator in accordance with code requirements for Non Separately derived system.

END OF SECTION

- C. Ground Strap
 - 1. For multiple ground conductor applications. Copper O.Z. Gedney type GES or approved equal. Use between ground clamp and multiple ground hubs.
- D. Miscellaneous fittings shall be malleable iron, hot dipped galvanized.
- E. Ground Terminals and Clamps
 - 1. Ground rod with outer copper layer over a rigid steel core. Minimum : 3/4" X 10'-0" long. Comply with UL 467. Shall be Heary Bros. Copperweld or approved equal.
 - 2. Four-wing copper ground plates shall be 3 1/2" X 18", 20 gauge, as manufactured by Heary Bros. or approved equal.
 - 3. Utilize heavy-duty bronze with screw pressure type stainless steel bolts and nuts.

2.03 SERVICE SWITCH 1200 AMPERES OR LESS – STAND-ALONE APPLICATION

- A. Service switches 1200 Amperes and below where indicated on plans as stand-alone, including those used for separately derived systems; shall be equal to molded case breakers specified in this section except that they shall be installed NEMA 1 enclosure, switches shall be 3 pole, and supplied with neutral kit to make suitable for use as service switch.

PART 3.00 - EXECUTION

3.01 SECONDARY ELECTRICAL SERVICE

- A. The secondary electrical service will be 120/208 volts, 3 phase, 4 wire, wye connected.
- B. The contractor shall furnish and install all necessary sleeves, conduit, wire, manholes, service end box, copper details, limiters, etc. as indicated on drawings and as required by Con Ed to facilitate receipt of electric service.
- C. All work pertaining to service entrances and service and metering equipment shall be installed in accordance with the Con Ed requirements and in collaboration with their representative. Provide C.T. cabinets, constructed in accordance with Con Ed standards and provide interconnect wiring to all Con Ed metering devices.
- D. A housekeeping pad or pedestal foundation 6" high and extending 5" from all sides of the service equipment and all switchboards
- E. All overcurrent devices are three (3) pole unless otherwise noted.
- F. Permanently affix Arc-Flash labels based upon specified short circuit, Arc-Flash hazard and coordination study.

3.02 GROUNDING

- A. Ground service equipment, conduit systems, supports, cabinets, transformers, poles, fixtures, etc., and the grounded circuit conductors in accordance with the latest issue of the New York City Electrical Code and these Contract documents.
- B. Provide bonding jumpers and wire, grounding bushings, clamps, etc., as required for complete grounding. Route ground conductors to provide the shortest and most direct path to the ground electrode system. Provide ground connections with clean contact surfaces by exothermic weld, or using listed pressure type connectors. Install ground conductors in conduit. Make readily accessible connections to continuous, metallic, underground cold water piping systems at a point where they enter the building. If this is not practical connect to a cold water pipe of adequate current carrying capacity as close as possible to the meter and provide a meter bonding jumper. Make connections to

Breakers shall have build-in test points for testing the long-time delay, instantaneous, and ground fault functions of the breaker by means of a test set. Provide one test set capable of testing all breakers 250-ampere frame and above.

- h. Circuit breakers over 225 ampere frame shall be listed circuit breakers for application at 100% of the continuous ampere rating per NEC in their intended enclosure.
 - i. Circuit breakers shall be HACR listed and have provisions to be padlocked in the open position.
 - j. All circuit breakers shall be rated for indicated short circuit bracing of switchboard. To obtain required A.I.C. capacities, circuit breakers in switchboard shall be fully rated. Combinations for series connected interrupting ratings shall be allowed provided protective devices are listed by UL as recognized component combinations and when approved by NEC.
 - k. Circuit breaker pickup level and time delay setting shall be adjusted to values as indicated by the coordination study specified herein.
 - l. Circuit breakers shall be Cutler Hammer Series G or equal of Square D.
- H. Nameplates
 - 1. Engraved nameplates shall be furnished for all mains and feeder circuits including control fuses and also for all indicating lights and instruments. Nameplates shall give load served, item designation and feeder and conduit sizes as well as frame size and appropriate trip rating. Furnish Master Nameplate giving switchboard designation, voltage ampere rating, short circuit rating, manufacturer's name, general order number and item number.
 - 2. Where circuit breakers are applied in compliance with listed series combination ratings, the supply feeder overcurrent device and the load equipment (panelboard, distribution panel, MCC, etc.) shall have an additional nameplate with marking: CAUTION. SERIES COMBINATION SYSTEM RATED AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.
- I. Finish
 - 1. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. Color and finish of the switchboard shall be ANSI 61 and use the manufacturer's standard process.
- J. Key Interlocks
 - 1. Key interlocks shall be provided as indicated in the drawings.
- K. Control Power Transformers

Control power transformers with primary and secondary protection shall be provided as required to operate ground fault systems.
- L. Transient Voltage Surge Suppression System: Install per Section 26 43 13 and 26 41 00.
- M. Manufacturers: Switchboard shall be as manufacturer by Lincoln Electric, American Switchboard, Electro-Tech, Eaton, Square D, or approved equal of Siemens.

2.02 SERVICE GROUNDING HARDWARE

- A. Ground clamp.
 - 1. Heavy duty type. Malleable Iron, hot dipped galvanized. O.Z. Gedney type "G" or approved equal.
- B. Ground Hub
 - 1. Malleable iron, hot dipped galvanized. O.Z. Gedney type GH-G, or approved equal. Use to terminate ground conductor run in conduit to ground clamp.

F. Customer Metering

1. For each service switch, except switches serving fire pumps, provide a separate customer metering compartment with front hinged door and include the following:
 - a. Current transformers.
 - b. Potential transformers including primary and secondary fuses with disconnecting means.
 - c. Multifunction power meters suitable for a 3 phase, 4 wire, wye configuration. Provide one meter for Ampere measurement and one (1) meter for Voltage measurement. Meters shall be Electro Industries/Guage Tech 3DAA for Ampere readings and 3DVA120 for Voltage readings, or approved equal.
 - d. Provide mounting kit for each meter.

G. Service Switch and Switchboard Overcurrent Devices

1. Devices shall be manually operated except devices requiring ground fault protection or shunt trip which shall be electrically operated unless otherwise indicated. All overcurrent devices shall be three (3) pole unless otherwise noted on drawings.
2. Molded Case Breakers
 - a. Protective devices as shown shall be molded case circuit breakers with inverse time and instantaneous tripping characteristics, built, tested and UL labeled per UL 489.
 - b. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be non-welding silver alloy and arc extinction shall be accomplished by means of arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.
 - c. Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the drawings.
 - d. Circuit breakers up to 225 ampere frame rating shall have thermal-magnetic trip units.
 - e. The maximum ampere rating and UL, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker.
 - f. Circuit breakers 250 ampere frame through 2500 ampere frame shall be equipped with microprocessor based RMS sensing trip units. Circuit breaker with frame sizes over 800 ampere shall be provided with a Arcflash energy reducing maintenance switch with local status indicator, integral to circuit breaker. Eaton ARMS System or equal.
 - g. Each molded case circuit breaker microprocessor-based tripping system shall consist of three (3) current sensors, a trip unit and a flux-transfer shunt trip. The trip unit shall use microprocessor-based technology to provide the adjustable time-current protection functions. True rms sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors, and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time-delay settings are reached. The trip unit shall be Eaton type Digitrip 310, Digitrip 310+ or approved equal.

An adjustable trip setting dial mounted on the front of the trip unit, or interchangeable ratings plugs shall establish the continuous trip ratings of each circuit breaker. Rating plugs shall be fixed or adjustable as indicated. Rating plugs shall be interlocked so that they are not interchangeable between frames, and interlocked such that a breaker cannot be closed and latched with the rating plug removed.

System coordination shall be provided by the following microprocessor-based time-current curve shaping adjustments:

1. Adjustable long-time setting (set by adjusting the trip setting dial or rating plug).
2. Adjustable short-time setting and delay with selective curve shaping.
3. Adjustable instantaneous setting.

The microprocessor-based trip unit shall have both powered and unpowered thermal memory to provide protection against cumulative overheating should a number of overload conditions occur in quick succession.

3. Control wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. All groups of control wires leaving the switchboard and at shipping splits shall be provided with terminal blocks with suitable numbering strips.
 4. Switchboard shall be provided with adequate lifting means and shall be capable of being rolled or moved into installation position and provided with floor sill to be set level bolted directly to the 6-inch high raised concrete pad.
 5. Formed structural steel or aluminum, forming a rigid structure. Turned down peripheral edges on front and rear panels.
 6. Construct to avoid magnetic loop, which may cause hysteresis heating.
 7. Completely enclosed on back, front, and sides with removable panels. Provide louvers top and bottom for adequate ventilation.
 8. Hinged front doors over gutter space to provide access to interiors. Doors are not to be provided over operating handles. Hold closed with captive knurled head screws.
 9. All sections same height, except for pullboxes.
 10. Paint units with one (1) coat of zinc chromate metal primer and two (2) finished coats of gray enamel.
 11. Provide barriers between each section of switchboard. Openings in barriers for bus shall be closed with snug fitting, non-hygroscopic, arc resistant materials such as "Lebonite". Similar barriers shall be placed between switchboard and pullbox. Minimum thickness 1/4".
 12. Provide UL label for entire switchboard, including short-circuit rating.
- B. Pullbox Over Switchboard
1. Provide pullbox of same type of construction and finish as the distribution switchboard where and if required for conduit terminations.
 2. Provide (if pullbox is utilized) cable supports for horizontal support of cables. Construct supports of 3/4" conduit loosely enclosed by strong fiber tubes. Space supports no more than 24 inches horizontally and 6 inches vertically.
 3. Where cable pull sections or top cable pullboxes contain Con Ed service cables, provide Con Ed acceptable sealing means.
- C. Bussing
1. Copper of 98 percent minimum conductivity copper or electrical grade aluminum.
 2. Bolted Connections: Bus conductors interleaved to secure maximum contact areas. Tin-plated joints and contact areas. All bus connections shall be bolted and accessible for tightening from the front.
 3. Bracing: 200,000 amperes (Root Mean Square) continuous symmetrical short circuit current.
 4. Provide full capacity neutral unless otherwise indicated on plans.
 5. A ground bus with minimum capacity equal to the larger of, 33 percent of main thru phase bus capacity, or one (1) - 2" x 1/4" copper bus shall be furnished, firmly secured to and electrically connected each vertical section structure, and shall extend the entire length of the switchboard. Incoming ground lugs shall be furnished. Other ground lugs for feeder circuits and grounding type bushings shall also be supplied.
 6. Provide bus link to disconnect incoming neutral service conductors from outgoing load neutral conductor. Disconnect link shall be located on load side of service neutral to main bonding jumper and grounding electrode connection. Bus link shall be readily accessible.
- D. Feeder Installation and Termination
1. Bolted and accessible. Hardware shall be high-tensile strength, zinc plated.
 2. Group cables paralleling one another and arranged so as to permit easy insertion of a clamp-on ammeter on each cable.
- E. Utility Metering
1. Where indicated on the drawings, furnish a separate barriered-off Con Ed Metering Compartment complete with hinged sealable door. Bus work shall include provisions for mounting Con Ed current transformers and potential transformers or potential taps as required by Con Ed. Provide Service Entrance Label and provide necessary applicable service entrance features per New York City Electrical Code. Construction of metering cubicle section to be in accordance with Con Ed specifications for secondary metering.

2. Maintenance Manual
 - a. Assemble from manufacturer a complete manual consisting of the Switchboard shop drawings. The manual shall also contain manufacturers operation and maintenance instructions, as well as manufacturers suggested spare parts list and list of special tools required. Upon approval of shop drawings provide five (5) copies to the COMMISSIONER.

1.06 AGENCY APPROVALS

- A. Prior to installation of any work associated with the electric service, this Contractor shall prepare necessary drawings and pay fees for submission to applicable agencies and Con Ed for all service work. No work shall be installed without all required approvals, including Con Ed.

1.07 SHORT CIRCUIT, ARC FLASH HAZARD AND COORDINATION STUDY

- A. Prepare and submit for approval a short circuit, arc flash hazard and coordination study. Study shall be based on the actual overcurrent protective devices submitted for approval. Provide overcurrent devices to meet or exceed available short currents indicated in the short circuit study. Studies shall be prepared in compliance with IEEE 141, 241, 242, 399, 551, and 1584. NFPA 70 E, and International Electrical Testing Association Inc. specifications for Short Circuit, Coordination, and Arc Flash Studies.
- B. Short circuit study shall, at a minimum, be based upon Con Ed fault current impedances, Con Ed voltage behind fault impedance, feeder impedances based upon contractors actual feeder distances, transformer impedances based upon units installed, and an allowance for motor contribution to the fault current. The resultant fault current shall be increased by a minimum of ten percent (10%) for use in selection of bus bracing and overcurrent device interrupting rating.
- C. Study shall include Arc-Flash hazard analysis based upon recommended overcurrent protection devices and settings, for each low voltage switchboard, motor control center, distribution panel, lighting panel and each medium voltage switchboard and overcurrent device cubicle. Provide Arc-Flash label for each of the switchboards, panelboards, motor control center and medium voltage equipment cubicles to identify Flash protection boundary, Hazard risk category, Incident Energy and working distance.
- D. Study shall be prepared, signed, and sealed by an Electrical Engineer licensed in New York State.
- E. Study shall include all data upon which the study is based, as well as results used to select each overcurrent device rating. Study shall include recommended settings of all adjustable overcurrent and ground fault devices. Study shall include all emergency and stand-by power system equipment, utilizing generator fault impedance where applicable.
- F. Study shall be submitted with, or prior to the time of switchboard, panelboard and automatic transfer switch submissions.

PART 2.00 - PRODUCTS

2.01 SWITCHBOARDS

- A. General Construction
 1. Furnish and install where indicated a dead front type, completely metal enclosed, self-supporting structure independent of wall supports. Voltage rating shall be 120/208 three (3) phase, four (4) wire. Each switchboard shall consist of the required number of vertical sections bolted together to form one rigid switchboard, requiring access from the front only.
 2. All service switches and all switchboards supplied by an Emergency Generator shall be individually mounted over current protective devices. All other switchboard over current devices may utilize group mounted over current protective devices.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and manufacturer' data for the following items:
1. Service and Distribution Switchboards
 - a. Provide fully detailed and dimensioned shop drawings. Include information on type and sizes of structural supports, metal thicknesses, surface finishes and bus cross sections; as well as single line diagrams of switch, fuse and bus arrangement.
 - b. Frame under glass a print of approved shop drawing showing wiring diagram and switch arrangement. Mount where directed by COMMISSIONER.
 - c. Include the following signed statement on the shop drawings:

"LAYOUT AND DIMENSIONS ARE BASED
ON ACTUAL FIELD DIMENSIONS."
 - d. Furnish a complete schematic wiring diagram and full set of equipment wiring diagrams. Include coordination study by manufacturer.
 - e. Short Circuit Ratings: Prepare single line diagram indicating all switchboards, panelboards, ATS switches, etc. Indicate device short circuit ratings, indicate UL listed series ratings of devices when upstream current limiting overcurrent device is employed, indicate all bus short circuit bracing.
- B. Test Reports: Submit certified test reports showing compliance of the following items in accordance with the Contract Documents.
1. Service and distribution switchboards specified by this section shall be given a 60 Hz A.C., dielectric test. Dielectric test shall be phase to phase, and phase to ground, at twice rated voltage plus 1,000 volts, but not less than 1,500 volts, for one (1) minute, prior to shipment from factory. A test voltage which is 20% higher than that in the one minute test may be applied for one (1) second as an alternative to the one (1) minute test. The date of the test and the name and title of the individual certifying the test shall be clearly shown on a label affixed to the equipment.
 2. Ground Systems
 - a. Perform fall-of-potential or alternative test in accordance with ANSI/IEEE 81 on the main grounding electrode or system. The resistance between main grounding electrode and ground shall not exceed 5 ohms.
 - b. Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames (i.e. switchboards, distribution panels, power panels and lighting panels), system neutral, and/or derived neutral points. Investigate and verify all ground connections associated with point to point resistance values which exceed 0.5 ohms.
 - c. Five (5) certified copies of all test results shall be forwarded to the COMMISSIONER.
- C. Maintenance Materials: Deliver to the The City of New York at the Project Site the following quantities of items in size/color distribution as directed. Store in locations directed, in unopened containers and in a manner recommended by the manufacturer:
1. Tools
 - a. Deliver to the The City of New Yorks representative all special tools required for proper operation and maintenance of the equipment provided. Submit comprehensive list of tools.

SECTION 26 2400 - ELECTRICAL SERVICE SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting rigging and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including but not limited to, the following:
 - 1. Provide electrical service system in accordance with the Contract Documents.

1.03 RELATED WORK

- A. Equipment Supports and Nameplates are included in this division as specified in Section 26 05 00.
- B. Surge Protection devices are included in this division as specified in Section 26 43 13.
- C. Seismic Supports, restraints and Attachment are included in this division as specified in Section 26 05 48.
- D. Excavation and Backfill are included in this division as specified in Section 26 05 00

1.04 QUALITY ASSURANCE

- A. Comply with applicable Con Ed requirements.
- B. Manufacturers Instructions:
 - 1. In addition to the requirements of these specifications comply with manufacturers instructions and recommendations for all phase of work.
- C. Except as modified by governing codes and by the Contract Documents, comply with applicable provisions and recommendations of the following.
 - 1. Switchboards: Comply with latest applicable standards of Underwriters Laboratories Standard U.L. 891 National Electrical Manufacturers' Association PB-2, and the New York City Electrical Code.
 - 2. Molded Case Circuit Breakers: Comply with underwriters laboratories standard UL 489. Comply with NEMA standard AB-3.

- b. During the programming of all control system protocols any fixtures connected to the emergency generator shall be "on".
 - c. Under emergency input power feed, all local control stations shall be inoperable. Once normal power is restored, all lighting zones shall revert back to their status prior to the emergency condition without requiring any action on the part of the user.
 - 6. During the fourth (4th) visit (to be conducted between 30 and 60 days after the third visit) the factory-employed technician shall conduct additional training seminar for the Commissioner's personnel on the system capabilities, operation and maintenance. As well as reprogram any part of the system at the direction of the Commissioner.
 - 7. During the fifth (5th) visit (to be conducted between 60 and 120 days after the fourth visit) the factory-employed technician shall conduct additional training seminar for the Commissioner's personnel on the system capabilities, operation and maintenance. As well as reprogram any part of the system at the direction of the Commissioner.
 - 8. During the sixth (6th) visit (to be conducted between 120 and 180 days after the fifth visit) the factory-employed technician shall conduct additional training seminar for the Commissioner's personnel on the system capabilities, operation and maintenance. As well as reprogram any part of the system at the direction of the Commissioner.
 - 9. All system programming will be done with the direction of the Commissioner by the factory employed technician (reference to all six (6) visits).
- C. The factory commissioned system shall entitle the end-user (the City of New York) to a ten (10) year replacement parts program that complies with the City of New York Procurement Policy Guidelines.

3.06 DEMONSTRATION

- A. The manufacturer shall provide a factory-authorized service representative to instruct the Commissioner's maintenance personnel to adjust, operate, and maintain lighting controls [see 3.05]. Refer to DDC General Conditions.

END OF SECTION

3. All compiled programs pertaining to the System.
4. All graphics files pertaining to the System.
5. Custom Software Control Interface Module(s)

3.05 SYSTEM ADJUSTMENTS AND PROGRAMMING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions.
- B. At the direction of the Commissioner, a factory-employed technician shall make a minimum of six (6) site visits to ensure proper system installation and operation.
 1. The first (1st) visit shall consist of a prewire (pre-installation) inspection. The following items shall be reviewed by the factory-employed technician during this visit:
 - a. All low voltage wiring requirements
 - b. Separation of power and low voltage/data wiring
 - c. Wire labeling
 - d. Information required on load schedules
 - e. Switching panel locations and installations
 - f. Control locations and addressing
 - g. Analog phone line requirements and computer jack locations
 - h. Load circuit wiring
 - i. Connections to other systems (security, fire alarm, etc.).
 2. The second (2nd) visit shall be upon completion of the installation of the architectural lighting control system. The following services shall be performed by the factory-employed technician during this visit:
 - a. Verification of proper connection and location of all controls according to manufacturer's control schedule
 - b. Energize processor panel and download system data program
 - c. Verify proper connection of panel links (low voltage/data) and address panel
 - d. Download system panel data to switching panels
 - e. Check Switching panel load types and currents and remove by-pass jumpers
 - f. Verify system operation control by control, circuit by circuit
 - g. Verify proper operation of manufacturers interfacing equipment
 - h. Verify proper operation of manufacturers supplied PC and installed programs
 - i. Verify operation of PC modem and test dial-up access
 - j. Obtain sign-off on system functions
 - k. Verification of the proper connection of power feeds and load circuits
 3. During the third (3rd) visit, the factory-employed technician shall demonstrate and educate the Commissioner on the system capabilities, operation and maintenance.
 4. The third (3rd) visit shall occur no later than 30 calendar days after substantial completion but no less than 45 days before scheduled project opening.
 5. During the third (3rd) visit; at the direction of the Commissioner, the control system shall be programmed by the factory employed technician with the following 7-day control protocols:
 - a. Final scenarios and selection of circuits to be contracted in each protocol shall be as per the Commissioner direction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to installation, examine work area to verify measurements, and that commencing installation complies with manufacturer's requirements.

3.02 WIRING INSTALLATION

- A. Wiring Method: Install wiring in raceways. Comply with Division 26 Section "Common Work Results for Electrical."
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and non-power-limited conductors according to conductor
- C. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.
- D. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in terminal cabinets, equipment enclosures, and in junction, pull, and outlet boxes.
- F. 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.

3.03 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 assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Test for circuit continuity.
 - 2. Verify that the control module features are operational.
 - 3. Check operation of local override controls.
 - 4. Test system diagnostics by simulating improper operation of several components selected by the Commissioner.

3.04 SYSTEM OPERATING SOFTWARE

- A. Contractor shall furnish media which will contain:
 - 1. Software and current licenses.
 - 2. All source code pertaining to the System.

EX-6	F16- EM	CONTINUOUS WALL MOUNTED 4.5 WATT/FT LED ILLUMINATED HANDRAIL WITH ASYMMETRIC DISTRIBUTION	70'	4.5W/FT	315W	NON- DIM			STR 02
EX-7	FX1 FX1- EM	WALL MOUNTED 23 WATT LED DOWNLIGHT	7	23W	161W	DIM			ROOF
EX-8	FX6- EM	FLOOR MOUNTED 10 WATT LED LUMINAIRE	12	10W	120W	NON- DIM			ROOF

2-33	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	1	20W	20W	NON-DIM			COPY ROOM/IT CLOSET
2-34	F11	RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	1	22W	22W	NON-DIM			ELECTRIC CLOSET
3-1	F3b	RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	32'	5W/FT	160W	DIM			STR 01
3-2	F3b-EM-AL	RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	28'	5W/FT	140W	DIM			STR 01
EX-1	FX1 FX1-EM	WALL MOUNTED 23 WATT LED DOWNLIGHT	10	23W	230W	DIM			EXTERIOR
EX-2	FX2	SURFACE MOUNTED 4' LONG 8 WATT/FT LED LINEAR LUMINAIRE	216'	8W/FT	1728W	DIM			EXTERIOR
EX-3	FX3	SURFACE MOUNTED 29 WATT LED FLOOD LIGHT	2	29W	58W	DIM			EXTERIOR
EX-4	FX4	INGRADE 21 WATT LED UPLIGHT LUMINAIRE	2	21W	42W	DIM			EXTERIOR
EX-5	FX5	WALL MOUNTED 8 WATT/FT LED SIGN LIGHTING	32'	8W/FT	240W	DIM			EXTERIOR

2-27	FX1	WALL MOUNTED 23 WATT LED DOWNLIGHT	2	23W	46W	DIM			NORTH PATIO
2-28	FX1	WALL MOUNTED 23 WATT LED DOWNLIGHT	2	23W	46W	DIM			SOUTH PATIO
2-29	FX4	INGRADE 21 WATT LED UPLIGHT LUMINAIRE	2	21W	42W	DIM			SOUTH PATIO
2-30	F3a- EM- AL F3b- AL	F3a: RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE F3b: RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	F3a: 1 F3b: 124'	F3a: 30W F3b: 5W/FT	650W	DIM			CORRIDOR
2-31	F3b F3b- EM F10	F3b: RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE F10: CONTINUOUS SURFACE MOUNTED 6 WATT/FT LED LINEAR DOWNLIGHT	F3b: 4' F10: 19'	F3b: 5W/FT F10: 6W/FT	134W	DIM			STR 01
2-32	F3B- AL F10- EM- AL	F3b: RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE F10: CONTINUOUS SURFACE MOUNTED 6 WATT/FT LED LINEAR DOWNLIGHT	F3b: 4' F10: 15'	F3b: 5W/FT F10: 6W/FT	110W	DIM			STR 01

2-21	F4 F11	F4: SURFACE MOUNTED 21 WATT LED WRAPAROUND LUMINAIRE F11: RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	F4: 1 F11: 1	F4: 21W F11: 22W	43W	NON- DIM		OFFICERS' TOILET
2-22	F3c- AL	RECESSED 40 WATT LED 4" WIDE SLOT LUMINAIRE	1	40W	40W	DIM		OFFICERS' BUNKROOM
2-23	F13	WALL RECESSED 3 WATT LED BED LIGHT	1	3W	3W	NON- DIM		OFFICERS' BUNKROOM
2-24	F4 F15	F4: SURFACE MOUNTED 21 WATT LED WRAPAROUND LUMINAIRE F15: RECESSED 20 WATT LED SHOWERLIGHT	F4: 1 F15: 1	F4: 21W F15: 20W	41W	NON- DIM		FEMALE F.F. TOILET/LOC KER ROOM
2-24	F11- AL	RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	2	22W	44W	NON- DIM		FEMALE F.F. TOILET/LOC KER ROOM
2-25	F11- EM- AL F11- AL	RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	3	22W	66W	DIM		POLE HOLE
2-26	F11- EM- AL F11- AL	RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	3	22W	66W	DIM		POLE HOLE

2-13	F6 F6a	F6: SURFACE MOUNTED 10 WATT LED UNDERCABINET TASKLIGHT F6a: SURFACE MOUNTED 7.5 WATT LED UNDERCABINET TASKLIGHT	F6: 1 F6a: 1	F6: 10W F6a: 7.5W	17.5W	NON-DIM			STUDY ROOM
2-14	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	4	20W	80W	NON-DIM			RECORDS STORAGE
2-15	F3b	RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	17'	5W/FT	85W	NON-DIM			COMPANY OFFICE
2-16	F3c	RECESSED 40 WATT LED 4" WIDE SLOT LUMINAIRE	8	40W	320W	NON-DIM			COMPANY OFFICE
2-17	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	2	30W	60W	NON-DIM			COPY ROOM
2-18	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	1	20W	20W	NON-DIM			IT CLOSET
2-19	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	2	20W	40W	NON-DIM			COMPANY LOCKERS
2-20	F3-AL	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	2	20W	40W	NON-DIM			COMPANY LOCKERS

2-7	F7 F15	F7: RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH F15: RECESSED 20 WATT LED SHOWERLIGHT	F7: 5.5' F15: 3	F7: 4W/FT F15: 20W	82W	NON- DIM			FIREFIGHTERS' TOILET
2-8	F3- AL F7- AL	F3: RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE F7: RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH	F3: 1 F7: 18'	F3: 20W F7: 4W/FT	92W	NON- DIM			FIREFIGHTERS' TOILET
2-9	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	2	30W	60W	NON- DIM			JANITOR CLOSET/LA UNDRY LINEN STORAGE
2-10	F4 F15	F4: SURFACE MOUNTED 21 WATT LED WRAPAROUND LUMINAIRE F15: RECESSED 20 WATT LED SHOWERLIGHT	F4: 1 F15: 1	F4: 21W F15: 20W	41W	NON- DIM			TOILET/LOCKER ROOM
2-11	F11- AL	RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	2	22W	44W	NON- DIM			TOILET/LOCKER ROOM
2-12	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	3	30W	90W	NON- DIM			STUDY ROOM

1-29	F10-EM-AL	CONTINUOUS SURFACE MOUNTED 6 WATT/FT LED LINEAR DOWNLIGHT	F10: 10'	F10: 6W/FT	60W	DIM			STR 01
2-1	F8a-AL	RECESSED 38 WATT LED 2' DIAMETER DOWNLIGHT	4	38W	152W	DIM			DORMITORY
2-2	F13	WALL RECESSED 3 WATT LED BED LIGHT	7	3W	21W	NON-DIM			DORMITORY
2-3	F7	RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH	36'	4W/FT	144W	NON-DIM			HEALTH/FITNESS
2-4	F8	RECESSED 154 WATT LED 4' DIAMETER DOWNLIGHT	1	154W	154W	NON-DIM			HEALTH/FITNESS
2-5	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	2	20W	40W	NON-DIM			FIREFIGHTERS' LOCKER ROOM
2-6	F3-AL	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	2	20W	40W	NON-DIM			FIREFIGHTERS' LOCKER ROOM

1-24	F14	SURFACE MOUNTED 50 WATT LED WALLWASH (FLOOD OPTIC)	4	50W	200W	DIM			ATRIUM/TRAINING CATWALK
1-25	F14a	SURFACE MOUNTED 50 WATT LED WALLWASH (SPOT OPTIC)	4	50W	200W	DIM			ATRIUM/TRAINING CATWALK
1-26	F3a-EM-AL	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	1	30W	30W	NON-DIM			ELEVATOR VESTIBULE
1-27	F7	RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH	10'	4W/FT	40W	NON-DIM			ELEVATOR VESTIBULE
1-28	F3b F3b-EM F10	F3b: RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE F10: CONTINUOUS SURFACE MOUNTED 6 WATT/FT LED LINEAR DOWNLIGHT	F3b: 8' F10: 10'	F3b: 5W/FT F10: 6W/FT	100W	DIM			STR 01

1-17	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	1	20W	20W	DIM			LOUNGE
1-18	F3- AL	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	1	20W	20W	DIM			LOUNGE
1-19	F7	RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH	10'	4W/FT	40W	DIM			LOUNGE
1-20	F3b	RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	5.5'	5W/FT	30W	DIM			LOUNGE
1-21	F4	SURFACE MOUNTED 21 WATT LED WRAPAROUND LUMINAIRE	76	21W	1596W	DIM			APPARATUS FLOOR
1-22	F4- AL F4- AL- EM	SURFACE MOUNTED 21 WATT LED WRAPAROUND LUMINAIRE	36	21W	756W	DIM			APPARATUS FLOOR
1-23	F5	CONTINUOUS SURFACE MOUNTED 5 WATT/FT LINEAR LED LUMINAIRE	160'	5W/FT	800W	DIM			ATRIUM/TRA INING CATWALK

1-12	F7 F12	F7: RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH F12: SURFACE MOUNTED ADJUSTABLE FLOOD LIGHT WITH 28 WATT LED PAR LAMP WITH GIMBAL RING	F7: 8' F12: 3	F7: 4W/FT F12: 28W	116W	NON- DIM			VESTIBULE
1-13	F3 F7 F3a	F3: RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE F7: RECESSED CONTINUOUS 4 WATT/FT LED PERIMETER WALL WASH F3a: RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	F3: 1 F7: 8' F3a: 1	F3: 20W F7: 4W/FT F3a: 30W	82W	NON- DIM			HOUSEWAT CH
1-14	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	4	30W	120W	NON- DIM			BUNKER GEAR
1-15	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	3	30W	90W	NON- DIM			SHOP AREA
1-16	F6	SURFACE MOUNTED 10 WATT LED UNDERCABINET TASKLIGHT	4	10W	40W	NON- DIM			SHOP AREA

1-7	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	8	30W	240W	NON-DIM			LUMBER STORAGE
1-8	F4 F11	F4: SURFACE MOUNTED 21 WATT LED WRAPAROUND LUMINAIRE F11: RECESSED 22 WATT 6" DIA. LED DOWNLIGHT	F4: 1 F11: 1	F4: 21W F11: 22W	43W	NON-DIM			ADA TOILET
1-9	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	1	20W	20W	NON-DIM			JANITOR CLOSET
1-10	F2 F3a	F2: SURFACE MOUNTED 36 WATT LED 7" X 4' GASKETED FIBERGLASS LENSED LUMINAIRE F3a: RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	F2: 1 F3a: 2	F2: 36W F3a: 30W	96W	NON-DIM			DECON AREA
1-11	F3b F3b-EM	RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	8'	5W/FT	40W	NON-DIM			VESTIBULE

1-1	F3a	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	5	30W	150W	NON-DIM			KITCHEN/DINING
1-2	F3a-AL-EM	RECESSED 30 WATT LED 4" WIDE SLOT LUMINAIRE	3	30W	90W	NON-DIM			KITCHEN/DINING
1-3	F6 F6a	F6: SURFACE MOUNTED 10 WATT LED UNDERCABINET TASKLIGHT F6a: SURFACE MOUNTED 7.5 WATT LED UNDERCABINET TASKLIGHT	F6: 1 F6a: 2	F6: 10W F6a: 7.5W	25W	NON-DIM			KITCHEN/DINING
1-4	F3	RECESSED 20 WATT LED 4" WIDE SLOT LUMINAIRE	8	20W	160W	DIM			CONFERENCE ROOM
1-5	F3b	RECESSED CONTINUOUS 5 WATT/FT LED 4" WIDE SLOT LUMINAIRE	21'	5W/FT	120W	DIM			CONFERENCE ROOM
1-6	F1a	PENDANT MOUNTED 25 WATT LED 6" X 4" INDUSTRIAL LUMINAIRE	4	25W	100W	NON-DIM			TOOL STORAGE

B-18	F2	SURFACE MOUNTED 36 WATT LED 7" X 4" GASKETED FIBERGLASS LENSED LUMINAIRE	2	36W	72W	NON- DIM			CONFINED TRAINING ROOM
B-19	F4a	SURFACE MOUNTED 37 WATT LED WRAPAROUND LUMINAIRE	11	37W	407W	DIM			CORRIDOR
B-20	F4a- EM- AL	SURFACE MOUNTED 37 WATT LED WRAPAROUND LUMINAIRE	10	37W	370W	DIM			CORRIDOR
B-21	F4a	SURFACE MOUNTED 37 WATT LED WRAPAROUND LUMINAIRE	2	37W	74	DIM			STR 01
B-22	F4a- EM- AL	SURFACE MOUNTED 37 WATT LED WRAPAROUND LUMINAIRE	3	37W	111W	DIM			STR 01
B-23	F4a	SURFACE MOUNTED 37 WATT LED WRAPAROUND LUMINAIRE	2	37W	74W	DIM			STR 02
B-24	F4a- EM- AL	SURFACE MOUNTED 37 WATT LED WRAPAROUND LUMINAIRE	3	37W	111W	DIM			STR 02

B-12	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			FUEL TANK ROOM
B-13	F1 F1- EM	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			ELECTRICAL ROOM
B-14	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	1	25W	25W	NON- DIM			ATS
B-15	F17	SURFACE MOUNTED 47 WATT LED EXPLOSION PROOF LUMINAIRE	1	47W	47W	NON- DIM			GAS METER
B-16	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			SCUBA ROOM
B-17	F2	SURFACE MOUNTED 36 WATT LED 7" X 4' GASKETED FIBERGLASS LENSED LUMINAIRE	11	36W	396W	NON- DIM			SIMULATION TRAINING ROOM

B-5	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	2	25W	50W	NON- DIM			ELEV. ROOM
B-6	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			BOILER ROOM
B-7	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			GEAR ROOM
B-8	F1 F1- EM	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			MECHANICA L ROOM
B-9	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	4	25W	100W	NON- DIM			WATER SERVICE
B-10	F1 F1- EM	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	2	25W	50W	NON- DIM			TELECOM
B-11	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	2	25W	50W	NON- DIM			WMD/HAZM AT

2.15 LIGHTING CONTROL SYSTEM LOAD SCHEDULE

- A. Refer to Electrical Drawings for Panel Schedules. Schedule shown below for general informational purposes only regarding lighting control zoning/channels. Any discrepancies shall be brought to the attention of the Commissioner at the time of Bid.

							BY ELEC ENG.	BY MFR	
ZONE	FIXT TYPE	DESCRIPTION	QTY	UNIT WATT	TOTAL LOAD	CNTRL TYPE	DIM CT.	DIM. RACK	REMARKS
B-1	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	6	25W	150W	NON- DIM			GOLD ROOM
B-2	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	3	25W	75W	NON- DIM			COLLAPSE ROOM
B-3	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	3	25W	75W	NON- DIM			GEO THERM AL
B-4	F1	SURFACE MOUNTED 25 WATT LED 6" X 4' INDUSTRIAL LUMINAIRE	2	25W	50W	NON- DIM			BUNKER GEAR ROOM

SINGLE LINE DIAGRAM (SHOWN FOR REFERENCE ONLY - REFER TO ELECTRICAL DRAWING FOR ENLARGED DIAGRAM)



2.12 USER INTERFACE CONTROL SYSTEMS

- A. Remote Keypad: The Keypad interface shall be capable of the following system control functions:
 - 1. Scene Recall
 - 2. On/Off
 - 3. Dim up/down
- B. Touch Screen and Virtual Touch Screen: Touch Screen and Virtual Touch Screen interfaces shall be capable of the following system control functions:
 - 1. Password Entry
 - 2. Room/Zone Selection
 - 3. Scene Recall
 - 4. Dim up/down
 - 5. Scene Recall
 - 6. Event Scheduler

2.13 PROGRAMMING AND CONFIGURATION SOFTWARE

- A. Lighting system configuration software shall allow custom programming of embedded operating systems for control of lighting system.
- B. Lighting system configuration software shall provide a graphical symbol based programming and development environment.
- C. Custom Software Control Interface Module – The Lighting System Configuration software shall generate Custom Software Control Interface Modules for communication with compatible remote integrated systems.
- D. The Custom Software Control Interface shall include the following control data:
 - 1. Complete lighting system control functions.
 - 2. System specific control sets for sub systems and supervisory systems.
- E. The Custom Software Control Interface shall be capable of communication the following data types:
 - 1. Bidirectional digital and analog data communication.
 - 2. Bidirectional serial data communication.

consistent readings by blocking direct sunlight, and also protects the lens from the elements.

2. Light Sensitivity: 5 to 750 foot-candles
3. Power: 24 VDC
4. Mounting: surface mount

- C. Indoor Photo Sensor, Open Loop Type: Continually monitors daylight entering window or skylight to enable daylight harvesting applications to provide control of room lighting based on presence of daylight. Equipped with 3-wire interface for direct connection to control system utilizing control processor; 24 VDC power from network control bus.

1. Mounting: surface mount

- D. Sensor Interface Device: Integrates occupancy sensors and related sensors with control network. In separate enclosure. 4-wire bus providing 24 VDC power to network devices, with two independent sensing inputs.

2.10 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG, complying with Division 26 Section "Basic Materials and Methods."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with copper conductors not smaller than No. 22 AWG, complying with Division 26 Section "Basic Materials and Methods.".
- C. Class 1 Control Cable: Multiconductor cable with copper conductors not smaller than No. 16 AWG, complying with Division 26 Section "Basic Materials and Methods."
- D. UTP Cable: 100-ohm, UTP. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
1. Communications Control Cable, Non-Plenum Rated: 22 AWG data pair stranded bare copper, and 18 AWG power pair stranded bare copper, Type CM.
 2. Communications Control Cable, Plenum Rated: 22 AWG data pair, stranded bare copper and 18 AWG power pair, stranded bare copper, Type CMP, complying with NFPA 262.
 3. Communications High-Power Control Cable, Non-Plenum Rated: 22 AWG stranded bare copper data pair, and 12 AWG stranded bare copper power pair, Type CM.

2.11 SYSTEM FUNCTIONS AND SEQUENCES

- A. System Control Functions: The system shall be capable of the following lighting control functions:
1. Scene Creation: store levels of selected fixture circuits in preset groups
 2. Scene Recall: recall previously stored scenes.
 3. Off: all zones off
 4. Dim up/down: raise/lower level of all zones.
 5. Password Entry: enter password to enable touch screen control access.
 6. Room//Zone Selection: select room, zone or area to be controlled.
 7. Event Scheduler: select times for scenes to be automatically recalled.

2. Power Supply: 50W, 24 V regulated power supply with two 4-pin network connectors, fuse-protected.

2.07 CONTROL INTERFACES

- A. Keypad. Each keypad includes:
 1. A single rocker button key configuration.
 2. A four button key configuration.
- B. Photosensor
 1. Photocell Sensor, Open Loop Type: Continually monitors daylight entering window or skylight to enable daylight harvesting applications to provide control of room lighting based on presence of daylight. Equipped with 3-wire interface for direct connection to control system utilizing control processor; 24 VDC power from network control bus.
 2. Mounting: As indicated.

2.08 USER INTERFACES

- A. Keypad
 1. Remote Keypad Controls: Field-configurable remote keypad with auto-adjusting backlight illuminating replaceable, engravable programmable buttons in number indicated, with white LED indicators, configured to fit in standard single-gang box.
 2. Color: As selected from manufacturer's full range of minimum 12 colors.
 3. Wall Plates: As selected from manufacturer's full range of minimum 12 colors. Use multigang plates if more than one switch is indicated at a location.
 4. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.

2.09 SENSORS

- A. Remote Occupancy Sensor: Detects movement within space while reducing false triggering or shutoffs while space is occupied. Combination of ultrasonic motion detection and passive infrared detection with internal microprocessor. Sensor independently adjustable for installed conditions. Delayed time off adjustment. Walk-through mode. Adjustable built-in photocell for daylight optimization. Equipped with 4-wire interface for direct connection to control bus;
 1. Photocell: Built-in ambient light photocell
 2. Additional: Interfacing: includes connection port for additional photocell.
 3. Coverage: 360 deg., 2000 sq. ft.
 4. Set-up and commissioning: parameters shall be configurable via a handheld wireless remote.
 5. Mounting: 3" octagon box or as indicated.
- B. Outdoor Photo Sensor
 1. Sensor shall continually monitors the total ambient light level and can adjust the lighting as necessary to reach the desired light level. The sensitivity is adjustable so that a 10V signal matches full daylight and 0V matches total darkness. A built in visor provides more

- D. System Clock: Firmware-based internal clock.
- E. Power Requirements:
 - 1. Power Supply: External.
 - a. Power Requirement: 8 Watts (0.33 amps at 24VDC).

2.04 NETWORK LIGHTING CONTROL PANELS

- A. Circuit Protected Network Lighting Control Panel: Branch Circuit Protected.
 - 1. Branch circuit: 120-240V
 - 2. Electronic Dimming Load Types: Electronic Low-Voltage, 0-10 Volt 4-Wire LED driver.
 - 3. Emergency Override: Remote override capability.

2.05 DIMMING AND SWITCHING MODULES

- A. Dimming and Switching Module: Universal dimming module - Incandescent, magnetic low voltage, electronic low voltage, neon/cold or 2 and 3-wire fluorescent dimming module.
 - 1. 4-channel universal lighting control module designed to support dimming of both forward and reverse phase type loads. A single model supports both 120 and 220-240 Volt electronic and magnetic low-voltage, incandescent, neon/cold cathode, 2-wire dimmable fluorescent, and non-dimmable lighting loads up to 5 Amps per channel, 10 Amps total. Channels of Switching: 6 channels of dimming with high inrush, zero-cross arcless, magnetic latching air gap off relays rated for 1,000,000 on/off lifetime cycles of switching.
 - 2. Maximum Load
 - a. Lighting: 5A per channel.
- B. Dimming and Switching Module: 0-10V LED driver or fluorescent ballast dimming module.
 - 1. 4-channel lighting control module designed to dim 0-10 Volt drivers and ballasts. A single model supports both 120 and 220 to 240 Volt applications. The DIN-4DIMFLV4 may also be used for switching of non-dimmable lighting loads up to 5 amps[1] and 1/2 HP motors. Channels of Switching: 4
 - 2. Maximum Dimmable Load
 - a. 0-10V LED driver: 5A per channel.
- C. Switching Module
 - 1. 8-channel lighting control module designed to support switching of non-dimmable lighting and fans. A single model supports both 120 and 220-240 Volt applications. Each channel handles incandescent loads up to 10 Amps, fluorescent loads up to 5 Amps, and also 1/2 HP motors.
 - 2. Channels of Switching: 8 channel switching.
 - 3. Maximum Dimmable Load
 - a. Lighting: 10A per channel.

2.06 GLOBAL ACCESSORIES

- A. Panel Accessories:
 - 1. Emergency Phase Loss Sensor: 120/277V, tripping transfer to emergency state.

1. Operating System:
 - a. Modular architecture supports multiple simultaneous running programs. Number of simultaneously running user programs: 10
 - b. Real-time, preemptive multithreaded/multitasking kernel
 - c. Vector floating point coprocessor.
 - d. Utilize a real time, event driven, multi-tasking, multi-threaded operating system.
 2. Communication:
 - a. Control Processor shall support direct communication with the following devices:
 - 1) Connected Ethernet devices.
 - 2) Devices connected to built-in control ports.
 - 3) Proprietary control network devices.
 - 4) BACnet IP devices.
 - 5) Control processors of same type.
 3. File Structure:
 - a. Transaction-safe extended FAT32 file system
 4. Memory:
 - a. RAM:
 - 1) 256 MB
 - b. Flash:
 - 2) Built-In: 2 GB
 - 3) MMC slot: up to 2 GB
 5. Network:
 - a. Built-in 10/100BaseT Ethernet port.
 - b. Built-In Web Server: IIS v.6.0
 - c. SNMP remote management.
 - d. Active Directory support.
 - e. IPv6 ready.
 - f. TCP/IP Communications
 - g. DHCP and DNS Support
 - h. Native Email Client
 - i. Remote Diagnostics
 - j. Remote Program Loading and Administration
 - k. SSL security plug in
 - l. Support user assigned or dynamic IP address.
- C. External Ports
1. The control system shall be equipped with the following external connection ports:
 - a. Connections:
 - 1) I/O 1 - 8: One 9-pin terminal block with 8 digital input/output or analog input ports.
 - 2) Relays: One 8-pin terminal block with four normally open isolated relays.
 - 3) Computer: One USB female 1.1 computer console port.
 - 4) LAN: One 8-wire RJ-45 connector.
 - 5) NET: Two 4-pin terminal blocks paralleled.
 - 6) Com 1 - 2: Two 5-pin terminal blocks.
 - 7) IR/Serial 1 - 4: One 8-pin terminal block with four IR/Serial output ports.

Phone - 212-462-0088
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2. Crestron Electronics, Inc.
Andrew Gross
6 Volvo Drive
Rockleigh, New Jersey 07647
Phone - 800-237-2041
agross@crestron.com
3. Leviton Manufacturing Co., Inc.:
Michael Mignone
201 North Service Road
Melville, NY 11747
Phone: 516-581-6957
mmignone@leviton.com

2.02 SYSTEM DESCRIPTION

- A. Web Accessible, network connected, lighting control system utilizing preset control software, central signal microprocessor, lighting control panel including power switching modules and relays, dimming modules, sensors, and user interfaces.
 1. System utilizes electronic dimming modules incorporating mechanically latching relays for dimming and on-off switching; an automation control system that interprets input signals and issues output signals to devices effecting a change in state; and a built-in hub that provides 8 isolated segments, each supporting up to 3000 feet of cabling, and up to 25 networked devices on each segment.
- B. System Components: System includes the following addressable components:
 1. Automation control processor
 2. Keypad controls
 3. Touch screen controls
 4. Remote occupancy sensors
 5. Timed room lighting
 6. Daylight compensating lighting controls
- C. Network: Integration of all lighting control panels shall occur over separate lighting-specific network.
- D. Remote access shall be provided by separate cellular network, or other method independent of FDNY building network.

2.03 CONTROL PROCESSOR

- A. Control Processor: DIN-rail mounted programmable control processor for lighting and automation applications.
- B. Minimum Characteristics:

1.12 TECHNICAL AND ADMINISTRATIVE REQUIREMENTS

- A. The submission of a bid by the Contractor will be construed as evidence that a careful, complete and thorough examination of the premises, existing job conditions and Contract Documents has been made and later claims for labor, materials or equipment required or for difficulties encountered, which could have been foreseen had such an examination been made, will not be recognized. It shall also constitute a representation that the Contractor has checked and verified all quantities, work and materials involved and shall take complete responsibility for any deficiencies encountered thereafter.
- B. The Contractor shall insure that the lighting control system manufacturer shall keep on file and make available for review by the Commissioner complete Quality Control and Quality Assurance records for all phases of production for all lighting equipment to be supplied under this project.
- C. Upon request the Contractor shall submit for review by the Commissioner verification that he has solicited pricing from all manufacturers which have been listed as "prime spec" and "approved equal." Upon request the Contractor shall submit for review itemized (line item) unit equipment costs for all equipment to be provided under the Scope of this Contract. The Contractor shall comply with the requirements of the City of New York Procurement Policy Guidelines.
- D. The Contractor shall be solely responsible for coordinating and expediting the timely procurement and delivery for the lighting control system, equipment and related components for the project.
- E. Specifications and drawings are intended to convey the salient features, function and character of the control system only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details not usually indicated on the drawings nor specified, but that are necessary or normally required for the proper execution, completion, installation and operation of the control systems shall be included, the same as if they were herein specified or indicated on the drawings.
- F. Omissions: The City of New York shall not be held responsible for the omission or absence of any detail, construction feature, etc. which may be normally required in the production of the lighting control equipment. The full and complete responsibility for accurately fabricating the control systems described herein to the fulfillment of those specifications shall rest solely with the Contractor.

PART 2 PRODUCTS

2.01 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. Acuity Brands Lighting:
Karen Blackman
5 Penn Plaza
New York, NY 10001

1. Software: Failure of input/output to execute switching commands.
 2. Failure of modular relays to operate under manual or software commands.
 3. Damage of electronic components due to transient voltage surges.
- B. For the duration of the warranty the control system manufacturer shall provide 24 hour, 7-day emergency service contact with trained factory personnel. Maximum acceptable response time to a call for service shall be 12 hours.
- C. Warranty Period [System]: The entire lighting control system (unless noted otherwise) shall carry a warranty for two (2) years from date of start-up after final written acceptance by the Commissioner.
- D. Warranty Period [Parts]: Cost to replace malfunctioning parts for eight (8) years from date of written acceptance by the Commissioner.
- E. Extended Warranty Period (optional): Cost of replacement parts that failed in service due to transient voltage surges (materials only, f.o.b. the nearest shipping point to Project site) for 10 years.
- F. Extended Warranty Period (optional): Cost to replace electrically / mechanically held relays for 10 years from date of Substantial Completion.
- G. During the Procurement process, each manufacturer shall submit for review and approval the name of the person/persons or agency who will be charged with the responsibility of fulfilling the manufacturer's field service obligations for the life of the warranty. Field service capability located beyond an 80-mile radius of the project's location shall be considered unacceptable. Each manufacturer shall comply with the requirements of the City of New York Procurement Policy Guidelines.
- 1.09 EXTRA MATERIALS**
- A. Electrically / Mechanically Held Relays: Equal to 10 percent of amount installed for each size indicated, but no fewer than 10 relays.
- 1.10 PROJECT / SITE CONDITIONS**
- A. The architectural lighting controls must operate in an ambient temperature range of 0°C (32°F) to 40°C (104°F) and 90% non-condensing relative humidity without the requirement of a regularly scheduled maintenance program for air filtration components.
- 1.11 MAINTENANCE**
- A. The manufacturer shall make available to the City of New York a method of ordering new equipment for expansions, replacement, or replacement parts for a minimum period of ten years from the final date of commissioning to be used as spares twenty-four hours a day, seven days a week. The manufacturer shall comply with the requirements of the City of New York Procurement Policy Guidelines.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency that complies with the NYC Electrical Code, and marked for intended use.
- C. Comply with 47 CFR, Subparts A and B, for Class A digital devices.
- D. Comply with NFPA 70.
- E. Manufacturer shall have a minimum of 3 years continuous experience in the manufacturing of lighting controls for similar facilities.
- F. Architectural lighting control system shall be UL, CSA, NOM or CE listed (where appropriate) specifically for the required loads (i.e. LED lighting fixtures). Manufacturer shall provide evidence of compliance on request.
- G. Manufacturer shall have their quality system registered to the ISO 9001 Quality Standard, including in-house engineering for all product design activities.
- H. Lighting control system shall meet IEC801-2, tested to withstand a 15kV electrostatic discharge without damage or loss of memory.
- I. Regulatory Requirements: Cabinets and all related components and subsystems shall comply with the following regulatory requirements:
 - 1. National Electric Code (N.E.C) [Article 100]
 - 2. NFPA 110 - Emergency and Standby Power systems
 - 3. National Electrical Manufacturer's Association (N.E.M.A)
 - 4. NEMA ICS 10 - AC Transfer Switch Equipment
 - 5. Underwriter's Laboratories, Inc. (UL) or (ETL)
 - 6. UL924- EM Bypass Relays
 - 7. Any local jurisdictional codes
 - 8. NYC Building Code

1.07 COORDINATION

- A. Coordinate lighting control components to form an integrated interconnection of compatible components.
 - 1. Match components and interconnections for optimum performance of lighting control functions.
 - 2. Coordinate lighting controls with that in Sections specifying distribution components that are monitored or controlled by power monitoring and control equipment.
- B. Coordinate lighting control components specified in this Section with components specified in other Sections.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within specified warranty period.

Failures include, but are not limited to, the following:

- C. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.
 - 1. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
- D. Provide a load schedule which indicates the actual connected load and load type per circuit, circuits and their respective control zones, circuits that are on emergency, and the capacity, phase, and corresponding circuit numbers (per the electrical drawings).
- E. Provide catalog cut sheets with performance specifications including historical testing data demonstrating complete compliance to all of the specifications herein.
- F. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
- G. Software Upgrade Kit: For the City of New York to use in modifying software to upgrade and to allow system expansion.
- H. Field quality-control test reports.
- I. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.
- J. Manuals: Prior to final inspection, provide complete set of operating and maintenance manuals. Include technical data sheets and parts ordering information. Include testing and maintenance requirements and instructions for emergency transfer components.
- K. Shop drawings shall be submitted in reproducible form. Fixture fabrication details shall be drawn at either full size or half size scale. Fabrication details shall illustrate a minimum of three (3) critical views indicating all fabrication and assembly methods, materials, material gauges and finishes to be employed.
- L. Catalogue submittals lacking sufficient detail to indicate compliance with contract documents shall not be acceptable.
- M. "Approved Equal" specification status does not and shall not exempt the identified manufacturers from full and complete compliance with all criteria identified either in the specifications or as attributed to "prime specification" equipment with regards to performance, control capability, size finishes, etc. Consideration, acceptance or rejection of any proposed submittal at any time shall rest solely upon the evaluation of the Commissioner for those areas within the project scope.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Obtain lighting control module and power distribution components through one source from a single manufacturer.

7. CONFORMANCE: System shall be manufactured in strict accordance with the Contract Drawings and Specifications.
8. IMPORTANT: Information regarding circuit designation, sizes and quantities is indicated elsewhere. Circuiting indicated in this section is included only to specify dimmer sizes and control capacities. DO NOT use this information for sizing branch circuit breaker panelboards, wiring or any other work not included in this section.

1.03 SUMMARY

- A. This Section includes the following lighting controls:
 1. Networked Lighting Control systems. Systems are composed of:
 - a. Network integrated power switching systems.
 - b. Network integrated dimming systems.
 - c. Standalone power switching and dimming systems.
 - d. Automation control processors
 - e. Sensors
 - f. User Interfaces:
 - 1) Keypad
 - 2) Virtual Touchscreen
 2. System Functions and Sequences

1.04 DEFINITIONS

- A. Control: Effecting a change in state by one PC program onto a microprocessor or device.
- B. Scene: Predetermined light level of a single fixture or group of fixtures.
- C. RS-485: A serial network protocol, similar to RS-232, complying with TIA/EIA-485-A.
- D. UTP: Unshielded twisted pair.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
 1. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
 2. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
 3. Wiring Diagrams: Power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.

SECTION 26 0971 - LIGHTING CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.02 DESCRIPTION

- A. General: Extent of lighting control system work is indicated on drawings and schedules, by requirements of this Section, Section 26 05 00, "Common Work Results for Electrical."
- B. Types: Types of control systems in this Section shall include the following:
1. Architectural
 2. Auxiliary Equipment
- C. Related Sections: Refer to other sections of Division 26 for the following:
1. Basic Materials and Methods.
 2. Wiring Devices
 3. Lighting Control Devices
 4. Emergency Power System
 5. Surge Protection Devices
 6. Lighting Equipment Lamps and Ballasts
- D. The extent of lighting control work includes, but is not limited to, the furnishing and installation of all lighting control components into complete and working lighting control systems as specified in this section, on the drawings, and as required by job conditions. System components include, but are not limited to:
1. Web-accessible, network-connected programmable lighting control system that receives digital or analog signals from addressable input devices, assembles signals at central signal processor, and distributes operating signals to addressable control devices that effect a change in state. System shall have capabilities for manual setup, and software setup through programming port, containing lighting, dimming, and switching control system, with power monitoring and related equipment for switching of non-dimmed loads.
 2. Control stations, including wall mounted low voltage remote controls.
 3. Control system network low voltage wiring and/or fiber cabling for interconnection of remote switches and master control stations.
 4. Photosensor(s) for operation of selected circuits.
 5. Occupancy sensors for the operation of selected circuits.
 6. Permanently installed terminal(s) and control stations for system programming and feedback.

- D. Utilize Vibration Isolation, as furnished by manufacturer with attachments to structure and bracing to withstand design earthquakes for Vertical Bus Duct.
- E. Utilize floor or wall seismic mountings for all other equipment.
- F. All slide out components in electric panels, emergency battery units, control panels, etc shall have latching mechanism or wrap around restraint to hold removable components in place.

3.03 BATTERIES

- A. Batteries shall be mounted on racks with wrap around restraints to ensure batteries cannot fall off rack. Spacers shall be used between cells to prevent battery case damage. Rack shall be elevated, seismically based, and secured to floor to withstand anticipated seismic loads.

END OF SECTION

PART 2.00 - PRODUCTS

2.01 SEISMIC RESTRAINTS AND VIBRATION ISOLATION

- A. General
 - 1. Devices to be installed outdoors shall be weatherproof. Steel shall be hot-dipped galvanized with cadmium plated hardware and neoprene coated springs.
- B. Seismic Cable
 - 1. Cables shall be pre stretched, galvanized 7x19 strand core aircraft cable.
 - 2. Cable shall not support gravity loads.
 - 3. Cables shall be attached to electrical system/component and the structure using Seismic cable brace component SCBH or SCBV by Mason Industries.
- C. Vibration Isolation Type Hangers
 - 1. Shall be suitable for Seismic restraint with Seismic rebound steel and bonded rubber washer.
 - 2. Type PC30NS or RW30N for Seismic restraint by Mason Industries.
- D. Floor or Wall Seismic Mountings.
 - 1. Captive neoprene mounting with steel housing and a captive steel insert embedded in neoprene.
 - 2. Type BR, RBA, RCA, and RDA for Seismic mounting by Mason Industries.
 - 3. For panelboards where able to accommodate required Seismic anchor stud attachments to wall; type PB by Mason Industries may be substituted.
- E. Restrained Spring Mounts
 - 1. Shall be bolted to floor or base with neoprene isolation pad. Spring shall have additional travel to 50% of the related deflection.
 - 2. Type SLR by Mason Industries.
- F. Manufacturers, Mason Industries, whose catalogue numbers are used in this specification or equal of LOOS & CO, Ace Mountings, or Vibration Eliminator Company.

PART 3.00 - EXECUTION

3.01 GENERAL

- A. Install in accordance with approved Seismic restraint submissions and manufacturers installation instructions.
- B. Conduit Connections to rotating or vibrating equipment shall be by flexible metal conduit or liquid tight flexible metal conduit.
- C. All conduits supported by building shall have supports to isolate vibration in addition to seismic restraints.

3.02 INSTALLATION - GENERAL GUIDELINES

- A. Utilize Vibration Isolation Type hangers with Seismic restraint cables for:
 - 1. All ceiling hung transformers.
 - 2. All structure supported horizontal bus duct.
- B. Utilize Restrained Spring mount for Engine generator mountings.
- C. Utilize attachments to structure and seismic bracing to withstand design earthquake for all structure supported conduit and cable tray, and emergency lighting

6. Electrical cabinet design shall comply with the applicable national Electrical Manufacturers Association (NEMA) standards. Cutouts in the lower shear panel that have not been made by the manufacturer and reduce significantly the strength of the cabinet shall be specifically evaluated.
 7. The attachments for additional external items weighing more than 100 lb (445N) shall be specifically evaluated if not provided by the manufacturer.
 8. Where conduit, cable trays, or similar electrical distribution components are attached to structure that could displace relative to one and other and for isolated structures where such components cross the isolation interface, the components shall be designed to accommodate the seismic relative displacements defined in Section 13.3.2.
- F. Seismic restraints and vibration isolators shall be of the same manufacturer.
- G. The Contractor shall provide vibration isolation for the following:
1. Engine - Generator Sets
 2. Electrical connections to all equipment listed above and to all rotating or vibrating equipment.

1.04 SUBMITTALS

- A. Submit manufacturer' data including installation instructions for each vibration isolator, Seismic support, Seismic restraint and Seismic attachment.
- B. Submit elevation and plan details indicating equipment, seismic support, Seismic attachment, Seismic restraint and vibration isolation.
- C. Submit plan locations of all Seismic restraints for distribution systems including conduit, cable tray and bus duct,
- D. Elevation details and plans shall contain Seismic restraints calculations demonstrating compliance with these specifications. Calculations shall be stamped by a Commissioner registered in New York State, with experience in Seismic design. The design shall be coordinated with the projects Commissioner to ascertain that the connections to the structure will resist the forces imposed by the design earthquake.
- E. Manufacturer Seismic Qualification Certification: Submit certification that equipment specified in this Section, accessories, and components will withstand seismic forces defined in this section "Seismic Supports, Restraints and Attachment". Include the following:
1. Basis for Certification: Indicate whether certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- F. This Contractor shall coordinate all Independent and Periodic special inspections for Seismic supports, restraints and attachments, in compliance with Section 1707 of the New York City Building Code for equipment installed by this Contractor. Submit final certified report indicating compliance.

SECTION 26 0548 - SEISMIC SUPPORTS, RESTRAINTS AND ATTACHMENT

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting rigging and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including but not limited to, the following:
 - 1. Provide Seismic supports, restraints and attachment, including vibration isolation, for all electrical equipment provided or installed by this Contractor in accordance with the Contract Documents.
 - 2. Provide the services of a Commissioner licensed in New York State, with experience in Seismic design. This Commissioner shall select and coordinate all Seismic supports, restraints and attachment methods.

1.03 QUALITY ASSURANCE

- A. New York City Building Code section 1613 and ASCE-7-10 including section 13.
- B. Design of Seismic supports, restraints and attachments shall be based upon Seismic Design Category (A) (B) (C) (D) with component amplification factor (a_p), component response modification factor (R_p), and overstrength factor identified in table 13.6.1. of ASCE-7-10.
- C. Component Importance Factor (I_p) shall be assigned as indicated in ASCE-7-10 section 13.1.3.
- D. Electrical components shall satisfy the requirements of ASCE 7-10 section 13.6. The attachments and support to the structure shall satisfy ASCE 7-10 section 13.4.
- E. Electrical components supports shall be designed for seismic forces defined in ASCE 7-10 sections 13.3.1 and 13.3.2; and in addition;
Electrical components with importance factor (I_p) greater than 1.0, shall satisfy the following additional requirements.
 - 1. Provision shall be made to eliminate seismic impact between components.
 - 2. Loads imposed on the components be attached utility or service lines that are attached to separate structures shall be evaluated.
 - 3. Batteries on racks shall have wraparound restraints to ensure that the batteries will not fall from the racks. Spacers shall be used between restraints and cells to prevent damage to cases. Racks shall be evaluated for sufficient lateral load capacity.
 - 4. Internal coils of dry transformers shall be positively attached to their supporting substructure within the transformer enclosure.
 - 5. Electrical control panels, computer equipment, and other items with slide-out components shall have a latching mechanism to hold the components in place.

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- G. Provide terminal boards of sizes as indicated on the Drawings for mounting by others of terminal strips, key equipment, etc. Locate where 3 foot (minimum) front access space is available. Provide supports when not located directly on wall.
- H. For each telephone, data and TV outlet, provide 3/4" E.C. from outlet to a junction box located above the nearest available accessible hung ceiling. Provide cables as noted on plans.
- I. Telephone Equipment Room: Outlets and devices shown in the telephone equipment room drawings are intended to indicate quantities only. Contact the telephone company for exact locations and make adjustments as required. Provide specified plywood backboard on all walls of equipment room as directed by service providers.
- J. Provide ground cable in conduit from cold water main at building service entrance to all telephone terminal boards and to all other communication systems terminal board locations. Provide minimum #6 awg ground, except to main frame room which shall be 1/0.

END OF SECTION

PART 2.00 – PRODUCTS

2.01 TERMINAL BOARDS

- A. Minimum 8' high by 3/4" thick plywood of size indicated on Drawings.

2.02 TELEPHONE OUTLETS

- A. Galvanized steel box 4" X 4" X 2 1/2" minimum dimensions. Jack and cover plate furnished by this Contractor.

2.03 DATA OUTLETS

- A. Same as telephone.

2.04 CABLE TV OUTLETS

- A. Same as telephone.

2.05 PULL LINES

- A. 3/32" outside diameter, 200 pound strength, polyethylene.

PART 3.00 – EXECUTION

3.01 INSTALLATION

- A. Provide all raceways, outlets, device plates, and terminal boards in conformance with the Contract Documents. Consult with the telephone company and comply with their requirements.
- B. Work by others: Furnishing all wires, instruments, relaying, switching equipment and making all connections.
- C. Incoming Service: Provide incoming service conduits for telephone cable TV, and data at the location shown on the drawings.
- D. Arrange conduit runs less than 100 feet from point-to-point so that they contain no more than two (2) 90° bends. Conduit runs exceeding 100 feet from point-to-point, with more than one (1) 90° bend, must contain square or oval conduit fittings ("Condulets") or conduit slip sleeves. All empty conduits to terminal boards are to enter top or bottom on the extreme right or left side.
- E. Provide empty conduit and conduit sleeves as indicated on drawings. Provide pullboxes in accessible positions for every 150 feet of straight raceway for all empty conduit.
- F. Provide pull lines in all raceways.

SECTION 26 0533 - EMPTY CONDUIT SYSTEMS

PART 1.00 – GENERAL

1.01 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Terminal boards and Telephone/Data outlets.
 - 2. Telephone conduit system and cable to Telephone/Data room.
 - 3. Data conduit systems and cable to Telephone/Data room.
 - 4. Cable TV conduit systems and cable to Telephone/Data room.

1.03 RELATED WORK

- A. Equipment supports as specified in Section 26 05 00.
- B. Basic materials and methods as specified in Section 26 05 19.
- C. Seismic Supports restraints and Attachment – Section 26 05 48.

1.04 QUALITY ASSURANCE

- A. Comply with Verizon's applicable requirements.
- B. Except as modified by governing codes and by the Contract Documents, comply with the provisions and recommendations of the following:
 - 1. American National Standards Institute.
 - 2. National Electrical Manufacturers Association.
 - 3. Underwriters' Laboratories.
 - 4. Applicable National Fire Protection Association Standards.
 - 5. Comply with New York City Electric Code Article 770 for Optical Fiber Cables and Raceways.
 - 6. Comply with New York City Electric Code Article 800 for Communications Circuits.
 - 7. Comply with New York City Electric Code Article 820 for Cable TV Distribution System.
 - 8. Comply with New York City Electric Code Article 830 for Network-Powered Broadband Communications Systems.

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3.08 FLOOR AND WALL OPENINGS

- A. Seal all floors and fire rated floor, ceiling and wall openings necessary to accommodate electrical equipment. This includes all openings in electrical and communications closet floors to permit vertical electrical and communications systems distribution. Seal communications system floor openings only after installation of all wires, cables, etc. including those installed by others. Utilize a approved fire stop system. A list of U.L. approved systems appears in "Through Penetration Fire Stop Systems" in the U.L. Fire Resistance Directory, Guide XHEZ.

3.09 GROUNDING

- A. Provide grounding in accordance with the New York City Electrical Code and as noted on Drawings, and described elsewhere in specifications.
- B. In addition, furnish a separate insulated green equipment ground conductor for all branch circuits.

END OF SECTION

- H. Extend wire sizing for the entire length of a circuit unless otherwise noted.
- I. Conduit runs shall contain quantity of circuits as shown on drawings. Combining circuits or wiring to effect a reduction in conduit homeruns will not be permitted except as per paragraph M this section.
- J. Type AC metal clad cable (BX):
 - 1. Application: May be utilized concealed in hollow spaces of building for lighting and receptacle branch circuiting. May not be used in lobbies, core areas, places of assembly, where exposed, or where prohibited by code.
 - 2. Install only with approved anti-short bushings.
- K. Type MC Metal Clad Cable:
 - 1. Application: May be utilized concealed in hollow spaces of building for receptacle and lighting branch circuiting. May not be used where prohibited by code.
 - 2. Install only with termination fittings listed for MC cable and of a type recommended by the manufacturer. Install with anti-short bushings per manufacturers recommendations.
- L. Common Neutral: A common Neutral is not permitted for two or three 15 Ampere or 20 Ampere branch circuits.
- M. Circuiting indicated on drawings is diagrammatic and intended to show devices on a common branch circuit. Contractor may, at his option may regroup indicated single pole 20 amp circuits into homeruns of his choice within the following criteria:
 - 1. Circuits requiring individual neutral: Maximum of four (4) circuits per homerun. Contractor may increase quantity to a maximum of nine (9) circuits per homerun provided all conductors are increased to #10 AWG, when homerun contains more than four (4) circuits.
 - 2. All homerun conduits shall be minimum 3/4" C up to six (6) circuit homeruns, increase size as required by code for ground and/or isolated ground conductors. For seven to a maximum of 9 circuits per homerun. Minimum size conduit shall be 1". Increase size as required by code for ground and/or isolated ground conductors as indicated on drawings or specified elsewhere.
 - 3. When homeruns are regrouped from those indicated on drawings, contractor shall provide 20% of the eliminated homeruns, but not less than one (1) per panel, as spare, empty conduit, for future use. Run from electric panel locations to centrally located, uniformly spaced locations on floor as directed by Architect/Engineer. Terminate in junction box with Nylon pull cord.

3.05 EMERGENCY POWER FEEDERS (NOT INCLUDING FIRE PUMP FEEDERS)

- A. All emergency power feeders, shall be 2 hour rated MI cable. This requirement applies to feeder from generator to generator distribution overcurrent devices, from generator distribution overcurrent devices to emergency transfer switches and from transfer switch to load served up to final branch circuit overcurrent device assembly, except when feeder is routed thru sprinklered space, type MI cable shall not be required.

3.06 EMERGENCY GENERATOR CONTROL WIRING

- A. See Section 26 32 13.

3.07 WIRING TO FIRE PUMPS INCLUDING SPRINKLER BOOSTER PUMPS

- A. See Section 26 29 23.

- F. Unless otherwise noted on Architectural plans, locate outlets as follows. Heights listed are from finished floor to center of device. Mounting heights for other equipment are as shown on the Electrical or Architectural Plans or as herein further indicated.
1. Convenience and signal outlets: 15 inches above finished floor unless otherwise noted.
 2. Lighting Switches: 3 feet, 6 inches, unless otherwise noted.
 3. Clock Outlets: Below ceiling.
 4. Wall Telephone Outlets: 4 feet 6 inches.
 5. Exit Lights: Wall mounted nine inches below ceiling to center line.
 6. Wall Mounted Fixtures: As indicated on drawings.
 7. Where counters occur, mount outlets above counter.
 8. Where bookcases occur, mount outlets in toe space.
 9. Fire Alarm Pull Stations: Mount not less than 3 1/2' and not more than 4 feet, 0 inches above floor level, to handle.
 10. Wall Mounted Battery Packs for Emergency Lighting: 8'-0" minimum above floor.
 11. Wall Mounted Fixtures: 7 feet, 6 inches or over mirrors as applicable or 1 foot below ceiling lower than 8 inches. Stairwell fixtures shall be 8 feet, 6 inches above finished floor or 1 foot below ceiling.
- G. Provide a standard access panel, having a hinged metal door neatly fitted into a flush metal trim, where a junction box or equipment is located above non-accessible ceilings or behind finished walls. Coordinate location and type with the Architect. Removable covers must be accessible at all times.

3.04 WIRES AND CABLES

- A. Provide a complete system of conductors in raceway system. Mount all wiring through a specified raceway, regardless of voltage application, unless specifically noted elsewhere.
- B. Drawings do not indicate size of branch circuit wiring. Unless specifically noted elsewhere in this Specification, minimum wire size is to be No. 12 except for motor starter control circuit which may be No. 14. For branch circuits whose length from panel to first outlet exceeds 75 feet for 120 volt circuits or 175 feet for 277 volt circuits, use AWG No. 10.
- C. Do not install wire in incomplete conduit runs nor until all moisture is swabbed from conduits. Insulation resistance to ground is not to be less than that approved by the New York City Electrical Code. Eliminate splices wherever possible. Where necessary, splice in readily accessible pull, junction, or outlet box. Clear interior of raceway of burrs, dirt, and obstructions before wires are pulled.
- D. Provide cable supports for all vertical risers in accord with New York City Electrical Code requirements.
- E. Flashover or insulation value of joints is to be equal to that of the conductor. Provide Underwriters' Laboratories listed connectors rated at 600 volts for general use, and 1,000 volts for use between ballasts and lamps of gaseous discharge fixtures.
- F. Use terminating fittings, connectors, etc., of a type suitable for the specified cable furnished. Provide compression equipment connectors, terminals or splices for all terminations or splices. Make bends in cable at termination prior to installing compression device. Make up all fittings tight. Recheck all splices and terminations and make mechanically and electrically tight during a fifteen (15) day period immediately prior to final acceptance of the work.
- G. Install wire in raceways and make up all terminations in strict accordance with manufacturer's recommendations using special washers, nuts, etc., as required.

3.02 GROUND FAULT CIRCUIT INTERRUPTER

- A. GFI Type receptacles for personnel protection, 5 ma type, shall be provided for all 120 volt 20 A and/or 15A receptacles in the following areas and as indicated on drawings.
1. Bathrooms
 2. Exterior spaces including rooftops
 3. Elevator Pits
 4. Elevator Machine Rooms
 5. Receptacles within 6' of any sink, shower stall or bathtub.
 6. Locker Rooms with showering facilities.
 7. Garages
 8. Kitchen

3.03 OUTLET, JUNCTION AND PULL BOXES

- A. Provide all outlet, junction cable support and pullboxes as indicated on the Drawings and as required for the complete installation of the various electrical systems, and to facilitate proper pulling of wires and cables. In general, install pull boxes, or pull fittings, no less than every 100 feet of straight horizontal run conduit or three (3) 90° bends, unless otherwise noted. Junction boxes and pullboxes shall be sized and supported per New York City Electric Code, unless otherwise noted. Provide barriers in boxes to separate wiring from different services per NYC Electrical Code Requirements.
- B. Provide bare copper ground wires, in all junction/pull box, larger than 4" X 4" interconnecting each conduit pair grounding bushings via ground lug. Size ground wire as follows:

<u>Feeder</u>	<u>Ground Wire</u>
up to #2	#8
#1 thru 1/0	#6
2/0 thru 3/0	#4
4/0 thru 350 MCM	#2
500 MCM thru 600 MCM	1/0

- C. The exact location of outlets and equipment is governed by structural conditions and obstructions, or other equipment items. When necessary relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to the room layout and will not interfere with other work or equipment. Verify final location of all outlets, panels, equipment, etc., with COMMISSIONER.
- D. Back-to-back outlets in the same wall, or "thru-wall" type boxes not permitted. For non-fire rated walls provide 12 inches (minimum) long nipple to offset for all outlets shown on opposite sides of a common wall to minimize sound transmission. Provide 24" (minimum) horizontal separation for outlets shown on opposite sides of a common, rated, fire wall or party wall.
- E. Where outlets are installed in steel stud type systems, provide additional cross bracing, bridging, and/or straps to make the outlet completely rigid prior to the application of the wall facing material.

3. Provide raceway installation (with appropriate sealoffs, explosion-proof fittings, etc.) in all special occupancy areas, as defined and classified in Article 500 of the National Electrical Code, in accordance with that article. In addition, provide conduit sealoffs where portions of an interior raceway system pass through walls, ceilings or floors which separate adjacent rooms having substantially different maintained temperatures, as in refrigerated or cold storage room and where raceways pass thru to exterior.
4. Rigid Galvanized Steel Conduit: Install in the following above grade areas:
 - a. Embedded concrete walls and floor slabs.
 - b. Where exposed to mechanical injury.
 - c. For power to smoke detection systems.
 - d. Where specifically required by the New York Electrical Code.
 - e. For underground or exterior work.
 - f. All remaining areas except as permitted or specifically required in the following paragraphs:
5. Intermediate Metal Grade Conduit:
 - a. IMC conduit with fittings as approved by the engineer may be utilized when permitted by codes and Commissioner in all areas listed under Item 4 Rigid Conduit except for items listed in paragraphs 4c and 4d which shall be rigid conduit.
6. Electric Metallic Tubing:
 - a. EMT may be used in lieu of rigid conduit or IMC for areas listed in sub paragraphs 4a and 4f only, provided that where installed in slab or fill, conduit is protected on all sides by a layer of non-cinder concrete at least 2 inches thick and concrete tight fittings shall be utilized and rigid conduit or IMC conduit bends and elbows shall be employed where exiting slab. EMT shall not be used for underground or exterior installations.
7. Provide flexible metal conduit in sufficient lengths not exceeding 6 feet for:
 - a. Branch circuits serving makeup of motor, transformer and/or raceway connections where isolation of sound and vibration transmission is required. For connections in locations exposed to weather and in interior locations subject to moisture, and motor connections use liquid-tight flexible metal conduit.
 - b. Connections to recessed lighting fixtures.
 - c. Provide separate grounding conductor. Securely grounded on each end of sections of flexible raceways. Size in accordance with New York City.
- C. Below Grade: Defined as the area below finished grade for a building exterior and below or within the bottom floor slab for a building interior. Below grade raceways to conform to the following:
 1. Extend below-grade raceways two (2) inches minimum above the floor or equipment foundation.
 2. Install exterior underground conduits 24 inches minimum below finished grade. Do not penetrate waterproof membranes unless proper seals are provided and penetration is approved by the COMMISSIONER.
 3. Below grade raceways shall be rigid steel. Where permitted by local codes and the Commissioner, contractor may utilize type IMC metal conduit raceways.
 4. Underground raceways run on site shall have a continuous warning ribbon installed 12" above raceway. Ribbon shall be a minimum 3" wide, with "Electric Line" in black letters on bright red background.
- D. Provide separate code size ground conductor in surface metal raceways.

PART 3.00 - EXECUTION

3.01 RACEWAY SYSTEMS

A. General:

1. Securely fasten all raceways at intervals and locations required by the New York City Electrical Code. Install capped bushings on conduits as soon as installed and remove only when wires are pulled. Securely tie embedded raceway in place prior to embedment. Conduits installed below or in floor slabs must extend minimum of 6 inches above the finished slab to the first connector. Lay out the work in advance to avoid excessive concentrations of multiple raceway runs. Locate raceways so that the strength of structural members is unaffected and they do not conflict with the services of other trades. Install 1-inch or larger raceways in or through structural members (beams, slab, etc.) only when in the manner accepted by the Commissioner. Draw up couplings and fittings full and tight. Protect threads from corrosion with one (1) coat red lead or zinc chromate after installation. Where galvanized conduit is used, use only steel pullboxes or malleable iron fittings.
2. Where a space of over 24 inches to suspended ceilings occurs, the suspending hangers may be utilized to support conduits of 1 inch or less trade size. Where suspended ceilings are 24 inches or less below the structure, provide independent support from the structure for all raceways.
3. Mount conduits a minimum of 8 inches above any accessible type ceiling or with spacing as required to permit relocation of recessed fixtures to any location.
4. Provide insulated grounding type bushings for all feeder conduits and for all branch circuit conduits entering enclosures, panels, pull/splice box etc. grounding bushings not required for branch circuit conduit terminations at standard 4" X 4" or smaller outlet box. Provide insulated bushings for all conduits not requiring insulated grounding type bushings. Secure conduit to all boxes and enclosures, by means of double locknuts one on inside and one on outside. Provide appropriate connectors, couplings for use with EMT to utilize specified bushings.
5. Minimum size conduit shall be 3/4.

B. Above Grade - Define as the area above finished grade for a building exterior and above top surface of any slabs (or other concrete work) on grade for a building interior. Above-grade raceways to comply with the following:

1. Install raceways concealed except at surface cabinets and for motor and equipment connection in electrical and mechanical rooms. Install a minimum of 6 inches from insulation when crossing or 12 inches from insulation when running parallel to flues, steam pipes, or other heated lines. Do not install within 36" from uninsulated flues, steam pipes, or other heated lines. Provide flashing and counter-flashing for waterproofing of raceways, outlets, fittings, etc., which penetrate the roof. Route exposed raceways parallel or perpendicular to building lines with right-angle turns and symmetrical bends. Run concealed raceways in a direct line and, where possible, with long sweep bends and offsets. Provide sleeves in forms for new concrete walls, floor slabs and partitions for passage of raceways. Waterproof sleeved raceways where required. Seal in an approved manner all raceway openings and sleeves through fire rated walls, floors, and ceilings after raceway installation.
2. Provide raceway expansion joints with necessary bonding conductor at building expansion joints and where required to compensate for raceway or building thermal expansion and contraction.

- C. Duplex Convenience Receptacles:
1. Three-pole, National Electrical Manufacturers Association and American National Standards Institute standard type, with bronze contacts which accept plug with two (2) parallel blades and one (1) grounding blade. Heat-resistant plastic enclosure. Break-off terminals for two (2) circuit wiring. Rated at 120 volts alternating current).
 2. Manufacturers: Hubbell Cat. # 5362 (20 Ampers). In damp or wet locations protected by GFI type C.B., use 5362WR or approved equal of Pass and Seymour or Leviton.
 3. Isolated Ground Receptacles shall be Hubbell Cat. #IG5362 or approved equal of Pass & Seymour or Leviton.
 4. Ground Fault Protection Type (GFI-Tamper resistant) shall be Hubbell Cat # GFR 5362 SG, or approved equal or Pass & Seymour or Leviton.
- D. Floor Outlets:
- Flush floor outlets for power and or telephone shall be Hubbell SystemOne made up of single, double or triple gang boxes as required and coordinated with concrete pour depth. Provide with number of 20A duplex receptacles and tel/data outlets as indicated on plans. Provide with rectangular covers, material, color, and finish as specified by architect. Cover type shall be based on floor application. Coordinate with architect.
- E. Outdoor Locations and Ground Fault Interrupter Receptacles:
1. Protect receptacles located outdoors or where indicated to be weatherproof by a GFI receptacle, Hubbell Catalog #GFR5362SG or approved equal.
 2. Protect exterior receptacles by a cast aluminum weatherproof metal plate with a stainless steel spring-loaded, casketed lift cover. Plate shall be U.L. listed for wet locations with cover open and with cover closed.
- F. Special Receptacles: Furnish and install special purpose receptacles to match cord and plug of equipment supplied or indicated circuiting, including twist lock type where indicated. Receptacles shall be Specification grade as manufactured by Hubbell or approved equal.

- b. Tool Applied: Steel cap, with conducting and corrosion resistant metallic plating, open at both ends, fitted around the twisted ends of the wire and compressed or crimped by means of a special die designed for the purpose. Specially fitted plastic or rubber insulating cover wrap over each connector. Manufacturer: Thomas & Betts "Stakon"; Ideal Industries" No. 410 Crim Connector" and "Wrap Cap"; Buchanan; Burndy or approved equal.
- H. Electrical Tape:
 - 1. Specially designed for use as insulating tape.
 - 2. Manufacturer: Johns-Manville; Minnesota Mining, or approved equal.
- I. Lubricant: Use lubricant only where the possibility of damage to conductors exists. Use only a lubricant which is inert to cable and conduit and in no way restrict ease of pulling through conduit with passage of time.
- J. Cable Systems:
 - 1. Type AC
 - a. Approved cable consisting of plastic insulated 90°C rated conductors, uninsulated ground wire, insulated ground wire as required on drawings or elsewhere in the specification, fillers, and an interlocking galvanized steel armor shield. Cable shall comply with UL 4 and NEC article 333. Cable shall be AFC cable systems Type AC-90 or HCF-90, or approved equal.
 - b. Install with approved bushings. Install with O.Z. Gedney PTFS Series, fire and smoke stop fitting for BX when supplying power to floor service heads which are not of the fire rated poke thru type.
 - 2. Type MC
 - a. Approved cable consisting of plastic insulated, 90°C rated copper conductors, insulated equipment grounding conductor per UL 1569 plus additional grounding and/or isolated ground conductors as specified elsewhere. Conductors shall be twisted and covered with a polyethylene terephthalate (polyester) assembly tape. A galvanized steel armor shall be applied over the inner cable assembly in compliance with U.L. 1569 Section 10. Cable shall comply with NEC article 330, U.L. 1569 and UL 83. Cable shall be as manufactured by AFC cable systems type MC and Super Neutral MC or approved equal.

2.04 SWITCHES AND WIRING DEVICES

- A. General:
 - 1. All devices shall be specification grade flush mounting. Duplex receptacles shall have Brown Face, local wall switches shall have Ivory Handle.
 - 2. Cover Plates: Provide cover plates for all wall receptacles outlets, including telephone and switches. Submit sample to Commissioner and obtain approval prior to installation. When two (2) or more switches or devices are shown at one location, mount under a common plate. Plates shall be brushed #302 stainless steel.
- B. Local Wall Switches:
 - 1. See DGA specifications for all switches and associated cover plates.

1. Type THWN/THHN insulation suitable for use in wet locations up to 90°C Centigrade. Use for lighting, receptacles and motor circuits and for panel, switchboard, service and equipment feeders, unless otherwise noted on drawings.
 2. Type THHN or THWN/THHN - Flame retardant: Heat-resistant thermoplastic insulation, nylon jacket rated for 90° Centigrade operation. Use for lighting branch circuit wiring installed and passing through the ballast channels of fluorescent fixtures, wiring in metal roofdecks in or near roof insulation, in joist spaces, or in raceways exposed to the sun.
 3. Type FEP: Fluorinated Ethylene Propylene insulated heat resistant wire suitable for 200°C operation. Use for any wiring within 3 feet horizontally or 10 feet above any furnace, boiler or similar appliance, or where high temperature wire is indicated.
- E. Manufacturers: General Electric, Phelps-Dodge, Triangle, Anaconda, Kaiser, General Cable, Okonite, Simplex, National Electrical Products, Collyer, Kerite, Raychem, or approved equal.
- F. Color code all wiring for control systems installed in conjunction with mechanical and/or miscellaneous equipment sections of this Specification in accordance with the wiring diagrams furnished with the equipment. Color code all branch circuit wiring, including circuits to motors, and all feeders by line and/or phase.

120/208 V 3-Phase

Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green

Factory color code wire No. 2 and smaller. Wire No. 1 and larger may be color coded by field color taping of the entire length of the exposed ends.

- G. Connectors:
1. General: Make all connections, splices, taps and joints with solder less devices, mechanically and electrically secure. Protect exposed wires and connecting devices with electrical tape or insulation to provide insulation values not less than on conductor. Make splices only in junction pullboxes, or panelboards with oversized wiring gutters to accommodate tap. All splices, taps, terminations, shall be approved for the temperature rating of the conductor.
 2. Large Cables (Copper No. 8 and larger):
 - a. Use compression type connectors, taps and splices specifically designed for the particular connection. Insulate splice with "Bake-lite" covers designed to fit around splice.
 - b. Manufacturer: Burndy Engineering Co., Inc; Thomas & Betts, or approved equal.
 3. Branch Circuit Wires (No. 10 and smaller): Use any of the following type of terminals and connecting devices:
 - a. Hand Applied: Coiled tapered, spring wound devices with a conducting corrosion-resistant coating over the spring steel and a plastic cover and skirt providing full insulation for splice and wire ends. Screw connector on by hand. Manufacturer: Ideal Industries "Wing Nut"; Thomas & Betts "Piggy"; 3M Co. "Scotch-Lok", or approved equal.

- O. Raceway fittings shall be malleable iron and steel galvanized or cadmium plated for steel conduit.
- P. Bushings shall be insulated type made of iron, threaded type with conduit end stop and integrally molded, non-combustible phenolic insulated surfaces rated 150°C. Grounding type bushings shall, in addition, have tin plated copper grounding path. Bushings shall be O.Z. Gedney type HB or approved equal of Steel City or Thomas & Betts. Grounding type shall be O.Z. Gedney type HBLG or approved equal.
- Q. Raceway Supports
 - 1. Support raceways on accepted types of wall brackets, specialty steel clips, or hangers, ceiling trapeze hangers, or malleable iron straps. Plumbers perforated straps are not permitted. Acceptable manufacturer's brackets or hangers are Kindorf, Elcan, Binkley, Multi-Frame, Power-Strut, or Unistrut, or an approved equal. Do not suspend raceways or equipment from other raceways, steam, water, or other piping or ductwork. Provide independent and secure support methods.

2.02 OUTLET, JUNCTION AND PULL BOXES

- A. Provide zinc coated or cadmium plated sheet steel outlet boxes not less than 4 inches octagonal or square, unless otherwise noted. Use shallow outlet boxes in columns millwork, mullions, and other areas where structural or physical conditions prohibit use of ordinary outlet boxes. Equip fixture outlet boxes with 3/8" no-bolt fixture studs. Where fixtures are mounted on or in an accessible type ceiling, provide a junction box and extend flexible conduit to each fixture. Outlet boxes in finished ceilings or walls shall be fitted with appropriate covers, set to come flush with the finished surface. Where more than one switch or device is located at one point, use gang boxes and covers unless otherwise indicated. Sectional switch boxes or utility boxes will not be permitted. Provide Steel City Series "GW" tile box, or as accepted, or a 4" square box or for multi-gang Steel City Series "G", with tile ring in masonry walls which will not be plastered or furred, or where "Drywall" type materials are applied. Provide outlet boxes of the type and size suitable for the specific application.
- B. Construct junction or pullboxes not over 150 cubic inches in size as standard outlet boxes, and those over 150 cubic inches shall be code gauge galvanized steel with screw on covers of same gauge metal. Provide cable supports (3/4" conduit covered by loose fitting fiber tubes) for two (2) or more horizontal rows of conduit entering box. Provide ground lug in all junction/pull box, larger than 4" X 4" standard outlet, box O.Z. Gedney type "KG" or equal for each conduits pair.
- C. Plug any open knockouts not utilized.
- D. Provide surface mounted outlet and junction boxes of cast metal with threaded hubs in unfinished indoor locations and where exposed to moisture and all outdoor locations.

2.03 WIRE AND CABLE

- A. Provide wire with a minimum insulating rating of 600 volts. Communications, circuits, and low tension systems, including fire alarm system wiring is specified elsewhere.
- B. Conductor:
 - 1. Electrical grade, annealed copper, and fabricated in accordance with ASTM standards. Minimum size number 12 for branch circuits; number 14 for control wiring.
- C. Stranding and Number of Conductors
 - 1. Number 12 and 10 solid.
 - 2. Cables larger than number 10, stranded, in accordance with ASTM Class B stranding designations.
 - 3. Control wires stranded in accordance with ASTM Class B stranding designations.
 - 4. Cables, multi-conductor, and as specified elsewhere for low-tension systems.
- D. Insulation

- F. Flexible Steel Conduit: Maximum length, 6 feet, unless specifically noted elsewhere. Single strip, continuous, flexible, interlocked, double wrapped steel, galvanized inside and outside forming smooth internal wiring channel, as manufactured by Anamet Electrical, type RWS, International Metal Hose, type RWS, or approved equal. Flexible metal conduit must be U.L. listed and contain an equipment bonding jumper wire bonded at each end or an equipment ground conductor, sized as required, except as permitted by code for 20 ampere branch circuits only. Provide connectors with insulated grounding type bushings.
- G. Liquid-Tight Flexible Electrical Conduit.
1. Same as flexible steel conduit except with tough, inert watertight plastic outer jacket, as manufactured by Anamet Electrical, "Seal-Tite" Type UA, International Metal Hose, type HLTUA or equal.
 2. Fittings: Cast malleable iron body and gland nut, cadmium plated with grounding lug cast integrally with gland nuts. Spiral molded nylon or vinyl-sealing ring between gland nut and bushing and nylon-insulated throat, as manufactured by Gedney, type 4QL or approved equal of Appleton, or Thomas & Betts.
- H. Wireways: Hinged or screw-cover type of sizes indicated or as required by the New York City Electrical Code for the quantity and size of wires contained within, complete with elbows, tees, connectors, adapters, etc., with all parts factory-fabricated and of the same manufacturer. Acceptable wireways are Square D "Lay-In-Duct", General Electric Co. "Type HS", Square D "Square Duct", or ITE "KBL-Duct", or approved equal.
- I. Surface Metal Raceway: Minimum .040 inches thick steel construction. Two-piece systems shall have galvanized base. Two piece unless otherwise noted on drawings. Provide compatible transition and adaptor fittings from conduit to surface metal raceway. Provide necessary fittings, boxes, elbows, ground clamps, connectors to facilitate complete installation. Surface metal raceway system shall be Wiremold or approved equal.
- J. Expansion Fittings: Provide at all building expansion joints or where required to compensate for raceway expansion and contraction. Provide with bonding jumper. Shall be similar to O.Z./Gedney Type AXB, TX, EXE, AXDX or DXX as required, with type BJ, bonding Jumper.
- K. Sleeves through fire-rated floors and walls: Conform to New York City Electrical Code and New York City Building Codes to prevent fire spread. All floors are fire rated. Refer to Architectural Drawings for fire walls.
- L. Where approved for use by the Commissioner utilize O.Z. Gedney CFS series (or approved equal of Edwards or Hubbell) fire seal for conduit penetration and CAFS series for cable penetrations of fire rated structure up to 3 hour rating. Utilize O.Z. Gedney PTFS series fire seal for non-fire rated, power or telephone service heads supplied via flexible steel conduit.
- M. Special seals shall be provided where penetrating roof slab. A malleable iron, watertight entrance sealing device, gland sealing assembly shall be pressure type permitting tightening by wrench after concrete has been poured. Unit to be similar to OZ Gedney type FSK, or equivalent. Install copper tubing or brass pipe sleeve through the roof. Solder 20 oz. copper or 6 lb. lead plate to the sleeve and mount on roof membrane waterproofing. Plate shall extend a minimum of 12" all around from the outside of the sleeve. After conduit is installed, fill space between conduit and sleeve with oakum or untarred, unoiled jute and seal the top and bottom to a depth of at least 1-1/2" with "Special Condensed" Duxsealer 4951 or other compound as acceptable to Commissioner.
- N. A malleable iron watertight entrance sealing device shall be provided where conduits enter exterior walls. Unit shall be gland sealing assembly on inside and outside of wall of pressure type, capable of being tightened with wrench after concrete is poured. Unit to be similar to OZ Gedney type WSK.

11. Type MC Cable: Comply with latest edition of U.L. 1569.
12. Receptacles: UL 943 Class A (GFCI), UL 498 (receptacles).
13. Switches: UL listed, Federal Specification WS-896.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for the following items:
1. Approved fire stop.
 2. Wire and Cable: Identify for what purpose each type will be used.
 3. Raceways: Catalog Cuts of each type, with proposed use identified.
 4. Switch and Wiring Devices: Sample of each type.
 5. Seismic support details for all raceways.

1.06 TESTS

- A. Test all conductors for continuity and proper connection after installation.
- B. Perform standard 500-volt insulation test with "Megger" tester on all wiring AWG #8 and larger installed. Tests are to show insulation resistance in excess of 50 megohms. Replace any conductors failing to meet this test.

PART 2.00 - PRODUCTS

2.01 RACEWAY SYSTEM

- A. Provide raceway as required for all wiring systems. Provide conduits whose sizes are not noted on the Drawings in accordance with the requirements of the New York City Electrical Code for the quantities and size of wire installed therein, including required ground conductors.
- B. Provide electrical metallic tubing manufactured of steel, galvanized and coated with a chromate coating on the outside and a silicone epoxy-ester lubricant on the inside. Use steel compression gland fittings, as manufactured by O.Z. Gedney or approved equal where running exposed within building. Set screw type fittings may be used for concealed work. EMT shall be Allied Tube and Conduit type EMT or approved equal.
- C. Where installed in slab or fill, provide concrete tight fittings. Utilize rigid heavy wall conduit bends and elbows where exiting from slab.
- D. Provide intermediate metal conduit manufactured of hot dipped galvanized steel, all threads shall be galvanized after cutting, and shall have chromate coating on the outside and a silicone epoxy-ester lubricant coating on the inside. Intermediate metal conduit shall be Allied Tube and conduit type IMC, or approved equal.
- E. Provide rigid conduit manufactured of hot-dipped galvanized rigid steel, with chromate coating. All threads shall be galvanized after cutting. Rigid conduit shall be Allied Tube and Conduit type GRC or approved equal.

SECTION 26 0519 - BASIC MATERIALS AND METHODS

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to the following:
 - 1. Provide basic materials and methods.

1.03 RELATED WORK

- A. Finish painting.
- B. Seismic Supports Restraints and Attachment - Section 26 05 48.

1.04 QUALITY ASSURANCE

- A. Manufacturers Instructions:
 - 1. In addition to the requirements of these Specifications, comply with manufacturers instructions and recommendations for all phases of the work.
- B. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following:
 - 1. American National Standards Institute, Institute of Electrical and Electronic Engineers, National Electrical Manufacturers Association and Underwriters' Laboratories, New York City Electrical Code.
 - 2. Electrical Metallic Tubing: Comply with the latest edition of Underwriters' Laboratories Standard UL-797, American National Standards Institute C80.3.
 - 3. Intermediate Metal Conduit: Comply with the latest editions of Underwriters' Laboratory Standard UL-1242 and ANSI C80.6.
 - 4. Rigid Metal Conduit: Comply with the latest edition of Underwriters Laboratories Standard UL-6, and American National Standards Institute C80.1.
 - 5. Conductors: Comply with American Society of Testing Materials and International Power Cable Engineering Associations.
 - 6. Surface Metal Raceways: Comply with latest edition of UL-5, and NEMA.
 - 7. Electrical Wireways: Comply with latest edition of UL-870.
 - 8. Dimmers (Wall Box Type): Comply with latest edition of UL-20.
 - 9. Power cables rated 2000 volts or less: ANSI/NEMA WC 70 ICEA 5-95-658.
 - 10. Type AC Cable: Comply with latest edition of U.L.-4.

Contractor shall distribute on the premises as directed all earth remaining after the backfilling.

- I. Any necessary blasting shall be performed by experienced and competent personnel in the most careful manner. All local ordinances and laws relating to blasting and storing of explosives must be strictly observed. No explosives shall be stored on the project property. All Contractors shall be notified prior to any blasting.
- J. Explosives used shall be subject to approval of the Commissioner. The blasting shall be properly covered with blasting mats.
- K. Any rock encountered within five feet (5') of pipes or building walls shall be removed without blasting. Any blasting required shall be performed at such times as to meet reasonable request of the Commissioner.
- L. The Contractor will do all patching of bituminous surfaces, concrete walls, driveways, streets, etc. necessary to complete his work. All patching shall match the existing surfaces. Patching shall be done by personnel skilled in their trades.
- M. Provide adequate temporary crossovers for pedestrian and vehicular traffic including guard rails, lamps, flags, as directed; remove same when necessary for such protection ceases.

3.17 WASTE MANAGEMENT

- A. Comply with the requirements established by the Sub-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

fill clearances between pipe and sleeves. Provide escutcheon plates on both sides of all rated construction in accordance with U.L. listing.

- B. Install through penetration fire stop systems in accordance with manufacturers written installation instructions and published drawings for products and applications. Install in accordance with all requirements of U.L. listing.

3.14 ACCESS PANELS

- A. The Contractor shall furnish access panels for installation by the Contractor for General Construction for concealed junction boxes, pull boxes and other parts requiring accessibility for operation and maintenance. Location of all access panels to be shown on coordinated shop drawings. Location to be approved by Commissioner prior to installation.

3.15 TEMPORARY SERVICE

- A. Temporary services are specified under Division 1, "DDC General Conditions".

3.16 EXCAVATION AND BACKFILL

- A. All excavation is unclassified. The Contractor shall inspect the site for soil to be excavated since no compensation will be given where rock is encountered.
- B. The Contractor, unless otherwise noted on the drawings, shall do all excavations for trenches, foundations, and pits of whatever kind necessary for the installation of this work. Bottom of trenches shall have the proper uniform grade wherever possible, or unless otherwise directed.
- C. Trenches are to be excavated to the widths, lines and grades indicated on the drawings and/or specified in the appropriate sections of these specifications. Trenches for and piping conduit are to be excavated to a minimum width of one foot (1') plus the outside diameter of the conduit. The trench shall be excavated in a manner such that the pipe will be located in the center of the trench with the trench bottom having the proper uniform grade. Trenches shall be deep enough to provide a minimum of three feet (3') fill over the conduit except as may be otherwise indicated on the drawings.
- D. If rock is encountered, carry trench to a point six inches (6") below conduit elevations. No conduit shall be bedded directly upon rock but shall be cushioned by a six-inch (6") layer of selected crushed stone or gravel.
- E. The Contractor shall do any shoring, bracing, etc., necessary to maintain the banks of his excavation, shall make good any damage done to property of adjoining premises or work of other Contractors due to his failure to properly shore his excavations. The Contractor shall do all pumping required to keep his excavation free of water, including rental of pumps, temporary power and labor.
- F. All excavations shall be left open until work has been inspected and approved by the A/E. Sufficient time shall be allowed after notice is given that work is ready for inspection for making all examinations and tests. Under no circumstances shall excavated material be left, even temporarily, where it will interfere with the building or other Contractor's operations.
- G. Excavations which pass under or within eighteen inches (18") of columns or wall foundations shall be backfilled up to the level of the columns or wall foundations with concrete mixed in proportions to one part cement, three parts sand and five parts coarse aggregate. Excavations shall not undermine foundations at a slope of 1:1 or greater.
- H. All earth backfilling shall be made in layers not to exceed eight inches (8") and each layer shall be thoroughly tamped into place before the next layer is placed. Backfilling shall be clean earth, free of stone, pieces of concrete, rubbish and other foreign materials. Material frozen in lumps or material softer than the adjoining soil shall not be used in backfilling. The

set. Fill voids left by removal of wedges with grout; finish exposed surface to grout to make neat appearance.

3.10 SEISMIC REQUIREMENTS

- A. Conduit, cable tray and equipment shall be supported and properly braced in accordance with New York City Building Code, and Section 26 05 48 of this specification.
- B. Seismic plans and calculations shall be prepared and designed by a Professional Engineer with a minimum of three years experience in seismic design.

3.11 PAINTING AND FINISHING

- A. Except as specified herein, the finished painting of Electrical Work within the building and on the roof shall be as specified in Division 9.
- B. All Electrical equipment shall have a factory applied prime and finish coat of paint. Galvanized surfaces shall be considered as finished surfaces for equipment rooms and items concealed from view. Plastic products shall be acceptable without a finish coat of paint. All items of equipment marred or rusted, even though factory finished, shall be repainted.
- C. Where conduits, outlet, junction, or pull boxes are mounted on a painted surface, or a surface to be painted, they shall be painted to match the surface. Whenever support channels are cut, the bare metal shall be cold galvanized.

3.12 IDENTIFICATION

- A. Furnish a nameplate for each fuse cutout, disconnect switch, relay, bus duct, and equipment enclosure including all panelboards and switchboards. Unless otherwise noted, use aluminum minimum size, 2 1/2" x 3/4", with black enamel background with etched or engraved upper case letters, enclosed by natural aluminum border, or black and white laminated Acrylic plate with beveled edges and same size and lettering. Inscribe name and number of equipment as shown on the Drawings include feeder size and identify source of power (panel and circuit) and as approved by the Commissioner. Secure to equipment with brass or stainless steel screws. Approved: Seton Nameplate Company, or approved equal.
- B. Tag each conductor passing through a splice or pullbox with a gray, fire retardent rigid polyethylene tag indicating point of origination and termination of the conduit. Use minimum #2 font. Brady or approved equal.
- C. Nameplates for equipment which is part of the emergency system are to be yellow backgrounds with black lettering, permanently affixed with brass or stainless steel screws to equipment, including all transfer switches, generators, and emergency distribution equipment.
- D. Nameplates for equipment which is part of the Smoke Detection Communication system are to be red background with white engraved lettering, permanently affixed to equipment including all fused cutouts, remote alarm lights, and equipment panels.
- E. Nameplates for enclosures which contain accessible grounding bus for low voltage systems, equipotential grounding system, or external accessible ground bus in Electric Service room, are to be green backgrounds with black lettering, permanently affixed with brass or stainless steel screws to the enclosure.

3.13 FIRE-STOP PROTECTION

- A. Where conduits, troughs, cable tray, cables, bus duct, etc. pass through fire rated partitions, fire rated walls, ceilings or floors, install a firestop that provides an effective barrier against the spread of fire, smoke and gases. Fire-stop material shall be packed tight, and completely

- B. Contractor shall include the following as applicable for all required Acceptance Testing:
 - 1. Obtain services of licensed Special Inspector to provide certificate of completed Inspections and Tests.
 - 2. Notification of appropriate City Agencies when tests are to be witnessed by either the Department of Buildings or the New York City Fire Department, and coordination of time and date of test with respective agencies.
 - 3. Provide sign-off on contractor's letterhead, signed and sealed certifying system has functioned properly in all required tests.
 - 4. Provide detailed documentation of tests as prescribed by applicable code.
 - 5. Provide labor and material, as required, to demonstrate performance of each system component and compliance with all mandatory tests.
- C. This contractor shall provide labor as required to facilitate acceptance testing performed by other contractors, including the following items:
 - 1. Fire Pump.
 - 2. Fire/Smoke Dampers.

3.09 EQUIPMENT SUPPORTS AND HOUSEKEEPING PADS

- A. Where supports, for equipment are indicated or specified in electrical work sections, perform as follows:
 - 1. Provide structural supports for the proper attachment of electrical equipment supplied and also for equipment, such as motor controllers, supplied by others, for mounting, connection, and installation under this Division.
 - 2. Mount wall-mounted equipment directly to wall by means of steel bolts. Maintain at least 1/2" air space between equipment and supporting wall. Mount groups or arrays of equipment on adequately sized steel channels, such as those manufactured by Kindorf and Unistrut.
 - 3. Support equipment suspended from ceiling by adjustable threaded steel rods of adequate diameter and strength anchored to the floor arch or the structural steel. Support auxiliary steel, if required, from the building steel. Do not secure hangers to furred ceilings, ductwork, or other piping.
 - 4. Secure equipment and steel to solid masonry by means of screw and bolt anchors and expansion bolts. On structural steel use clamps that do not depend primarily on set-screw pressure for security.
 - 5. Do not drill or pierce structural and prestressed concrete members without prior approval.
 - 6. Unless otherwise indicated, where equipment is indicated or specified to be floor mounted on stands or legs, brace and fasten with flanges bolted to floor.
- B. Housekeeping Pads:
 - 1. Where concrete housekeeping pads are indicated or specified, use concrete mix reinforcement where required.
 - a. Where floor is waterproofed, construct foundation so that anchor bolts will not pierce waterproofing hardener; paint to match finished floor.
 - b. Where pad design is not indicated on the drawings, provide housekeeping pads for all floor-mounted equipment. Pad dimensions, size of foundation bolts, methods of setting, aligning and anchoring of equipment shall be as recommended by manufacturer of equipment and as approval. Make minimum height above finished floor 4" and extend outer edges 2" minimum beyond machinery bedplate. Submit shop drawings for approval.
 - c. For equipment on pad, provide foundation bolts, sleeves, washers, nuts and templates to locate position of bolts. Make sleeves of steel pipe; finish flush with top of rough concrete. For anchorage, make embedded end of bolts hooked, or threaded with nut and square plate.
 - d. Provide 1" thick grouting between machinery base plate and concrete pad; fill completely the space between them. Clean top of pad; wet if before grouting. Do not remove leveling wedges before grout wedges before grout reaches its final

- C. The work shall be carefully laid out in advance. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of raceway, outlet or other electrical equipment, the work shall be carefully done. Any damage to the building, piping, equipment or defaced finish plaster, woodwork or metalwork shall be repaired by skilled mechanics of the trades involved at no additional cost.

3.04 TEMPORARY OPENINGS

- A. Temporary openings not indicated which may be required or purpose of bringing equipment into building shall be as approved. The contractor will perform work of providing and maintaining openings and of restoring structure, as required to facilitate installation of equipment within building at locations indicated.
- B. Holes provided in General Construction work to permit installation of lines for temporary Electrical services will, after removal of such lines, be patched as specified.

3.05 CLEAN-UP

- A. The Contractor shall be held responsible for the general clean-up of all areas affected by the work in the Contract. All rubbish and accumulative material shall be removed from the premises and the premises left "broom clean" upon completion.

3.06 CLEARANCES FOR ELECTRICAL EQUIPMENT

- A. No electrical equipment, panels, switchboards, disconnect switches, splice boxes, starters, etc., shall be installed where less than required working space clearances, as defined by applicable National or Local Electrical Code, can be maintained. Bring such conditions to attention of A/E immediately. Equipment found to be installed with less than required clearances shall be relocated as directed by Commissioner at no additional cost.

3.07 TESTING, ADJUSTING AND BALANCING LOADS

- A. Make all required adjustments to electrical systems until all specified performances are met. Contractors shall furnish necessary labor to test for conformance to specifications. Include manufacturers representative. Test shall be witnessed by Commissioner and the City of New York representative. The following system shall be tested for conformance to specifications:
 - 1. Smoke Detection System.
 - 2. Emergency Generator.
 - 3. Lighting Control System
- B. Phase legs of all existing and/or new panels shall be balanced at supply point. Any panel with unbalanced loads shall have its circuits rearranged as required to balance phase legs.
- C. Check all motors for correct rotation on initiated start-up.

3.08 ACCEPTANCE TESTING

- A. This contractor shall provide all Acceptance Tests required by applicable codes including the following:
 - 1. Smoke Detection Systems per New York City Building Code Sections 907.16 and 907.17, Appendix Q Section 106, and New York City Fire Code Sections 901.5, 907.17, and 907.18.
 - 2. Carbon Monoxide Alarms and/or detectors per New York City Building Code Sections 907.7.1.1.2
 - 3. Emergency Power System per New York City Electrical Code Section 700.4.

- G. Install all Work to permit removal (without damage to other parts) of all parts requiring periodic maintenance or replacement. Arrange pipes, ducts, raceways, to clear the openings of swinging doors and of access panels.
- H. Where Work is to be installed in close proximity to Work of other Contractors, and there is evidence that the Work will interfere with Work of other Contractors, assist in working out space conditions to make a satisfactory adjustment.
- I. Equipment installed by the electrical trade shall be installed in accordance with the requirements of approved manufacturers submittals or shop drawings. This Contractor shall carefully review approved shop drawings of all equipment to be installed by him to ascertain particular requirements. Any equipment or work installed which is not in accordance with the manufacturers shop drawings or installation instructions will be removed, replaced and installation corrected by this Contractor to comply with the manufacturers shop drawings at no additional cost.
- J. The locations of lighting fixtures, outlets, panels and other equipment indicated on the wiring plans are approximately correct, they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed in order to meet field conditions or to coordinate with modular requirements of ceilings, or to simplify the work, or for other legitimate causes.
- K. The drawings show only the general run of conduits and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the A/E and receive his approval before such alterations are made.
- L. Obtain from the Commissioner in the field the location of such outlets or equipment not definitely located on the drawings.
- M. Circuit "tags" in the form of arrows are used where shown to indicate the home runs of conduit to electrical distribution panels and switchboards. These tags show the circuits in each home run and the panel distribution. Show the actual circuit numbers on the finished record tracing and on panel directory card. Where circuiting is not indicated, contractor shall provide required circuiting in accordance with the loading indicated on the drawings.
- N. The drawings generally do not indicate the exact number of wires in each conduit for the branch circuit wiring of fixtures and outlets or the actual circuiting. Conduit runs shall contain quantity of circuits as shown on plans. Combining circuits or wiring to effect a reduction in conduit home runs to panel will not be permitted. Provide the correct wire size and quantity as required by the indicated circuiting and/or circuit numbers indicated and control wiring diagrams, if any, specified voltage drop or maximum distance limitations, and the applicable requirements of the New York City Electrical Code.
- O. These specifications are basically equipment and performance specifications. Actual installations shall be as shown on the drawings.

3.03 CUTTING AND PATCHING

- A. All cutting and patching associated with the installation of the Electrical work is the responsibility of this contractor.
- B. No cutting of bearing walls, beams, etc. shall be done without the approval of the Commissioner. All materials, patching and finishing, etc. shall match the surroundings. All cutting and patching shall be done by workmen skilled in the trades and in the employ of the Contractor for the project. All cutting shall be done with saw-type edges to give a neat and workmanlike appearance. All pipe and sleeve holes shall be core drilled unless specified otherwise.

3. NOMINAL VOLTAGES (UNLESS OTHERWISE NOTED)
 - a. Secondary distribution: 120/208 volt, 3-phase, 4-wire.
 - b. Convenience outlets: 120 volt, single phase, 2-wire.
 - c. Lighting: 120 volt single phase, 2-wire.
 - d. Motors: ½ horsepower and larger; 208 volt, 3-phase.
 - e. Motors smaller than ½ horsepower: 120 volt, single phase.
 - f. Provide equipment of sufficient poles and voltage rating to correctly function at the above voltage.
4. WIRE TERMINATIONS
 - a. All terminations shall be U.L. approved for use with minimum 75°C wire.

2.04 FIRE STOP PROTECTION

- A. Provide systems or devices listed in the U.L. Fire Resistance directory under categories XHCR (firestop devices) and XHEZ (firestop systems) as applicable, providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system is symmetrical for wall applications. Materials must be asbestos-free.

PART 3.00 - EXECUTION

3.01 SUPERVISION

- A. All work shall be performed by competent mechanics under supervision of an experienced supervisor. The Contractor shall, upon initiation of construction, keep a suitable force of men (including supervisory personnel) on the site at all times in order to place all sleeves, inserts, outlet boxes and fixtures, and all other openings as are required for the satisfactory installation of equipment.

3.02 COORDINATION

- A. Contractor's attention is directed to scheduling of construction and time limitations for each phase of the work. Work shall be coordinated to permit proper setting of the work of other trades.
- B. Where conduit work and electrical equipment are in place prior to completion of adjacent concrete and masonry work, they must be protected against damage and displacement until construction is completed.
- C. Provide all anchor bolts, sleeves, inserts and supports for the required Work.
- D. Adjust locations of pipes, ducts, electrical raceways, switches, panels, equipment, fixtures, etc., to accommodate the Work and to prevent interferences anticipated and encountered. Determine the exact route and location of each pipe, duct and electrical raceway prior to fabrication.
- E. Lines which pitch shall have the right-of-way over those which do not pitch. For example: Plumbing drains normally have the right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed.
- F. Make offsets, transitions and changes in direction in pipes, ducts, and electrical raceways as required to maintain proper headroom and ceiling heights as shown on architectural drawings and pitch of sloping lines whether or not indicated on the Drawings.

- A. Where a specific model and manufacturer of equipment is specified, the contractor shall provide what is specified without substitution. Where specified as "or approved equal", the contractor may substitute equipment except that the burden is upon the Contractor to prove such equality. If the Contractor elects to prove such equality, he must request the City of New York and Commissioners approval in writing to substitute such item for the specified item, stating the cost difference involved with supporting data, and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty and cost. A submittal for a proposed substitution must include comparative data of all performance criteria contained in manufacturers data, the specifications, schedules and drawings and delineate all differences between the proposed substitution and the specified equipment in terms of space requirements, access requirements, supports, connections, power wiring, controls, and all other differences which may require changes to other work, or performance.
- B. Substituted equipment, where permitted, must conform to space requirements (including required access space). Any substituted equipment that cannot meet space requirements shall be replaced at the Contractor's expense. Any modification of related systems (piping, ductwork, architectural, structural, electrical, plumbing, fire protection, etc.) or additional cost that result from substituted equipment shall be borne by this Contractor.
 - 1. In addition, for substitutions of emergency lighting fixtures or emergency ballasts, this Contractor shall prepare and provide for approval prior to purchase of equipment a computer generated point by point, footcandle printout for egress paths, all assembly spaces, and portion of exterior exit immediately adjacent to exit doors, on a 1 foot by 1 foot grid, starting at the edge of the space or egress path. Additional points shall be calculated to provide points one foot on center along all edges of the space or egress path, including the identified "minimum point". In addition, provide maximum footcandle point within the space or egress path and the maximum to minimum ratio, along with the average footcandle level at the floor. Printout shall include complete documentation on basis of calculations.

2.02 PRODUCT HANDLING

- A. In addition to the requirements of the General Conditions, the contractor shall be responsible for the following:
 - 1. Responsibility for care and protection of Electrical work rests with the contractor until it has been tested and accepted.
 - 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage from all causes.
 - 3. Protect equipment outlets and pipe openings with caps.
 - 4. At the completion of the work, clean and polish fixtures, equipment, and materials.
- B. The contractor shall receive, properly house, handle, hoist, deliver to proper location, equipment and other materials required for the contract. Save materials in a manner which will protect them from damage, weather, and entry of debris.
- C. In the event of damage, immediately make all repairs and replacements necessary for the approval of the Commissioner and at no additional cost to the City of New York.

2.03 MATERIALS

- A. Design:
 - 1. Unless otherwise specified, equipment or material of same type of classification, used for the same purpose, shall be products of the same manufacturer. All material shall be new and of the latest design of manufacturer providing equipment or materials. All materials are to be free of defects and corrosion.
 - 2. Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with NEMA, IEEE, or other applicable technical standards, suitable for maximum working voltage, current and available short circuit current and shall have neat and finished appearance.

1. Visual certification that required components of such systems are complete in accordance with the manufacturer's installation guidelines and the approved construction documents.
 2. Supports, hangers, seismic bracing, and vibration isolation equipment are properly spaced and anchored to supporting structure.
 3. Installation of required signage and safety instructions.
 4. Electrical components are installed and electrical sign-off issued.
 5. Required labeling, operational instructions and safety signage properly posted.
 6. All related Special Inspections for such systems are complete.
- D. Progress inspections of electrical systems shall include the following as applicable to the system:
1. Through-penetration fire stopping.
 2. Energy code compliance with approved construction documents in accordance with Chapter 5000 of the New York City Energy Conservation Code [1 RCNY §5000-01].
- E. Tests of electrical systems shall be performed in accordance with the following New York City Building Code and New York City Energy Code Conservation:
- | | |
|---------------------|-----------------------------|
| Code Section | Item |
| Lighting Controls | 5000-01 |
| Tandem Wiring | 5000-01 |
| Emergency Generator | NYCEC 700.4 + NYCBC 1704.31 |
- F. The following is a list of required Special Inspections:

<u>Special Inspection Item</u>	<u>Code/Section</u>
Emergency Power Systems (Generators)	BC 1704.31, BC 2702
Firestop, Draftstop, and Fireblock Systems	BC 1704.27
Seismic Isolation Systems	BC 1707.7
Fire Alarm Test	BC 907.7, 28.2-Q106.1, FC-907.17
Energy code compliance ECC Chapter 5000	BC 109.3.5 and

- G. All deficiencies noted on Progress or Special Inspection reports shall be corrected by this Contractor. Contractor shall arrange for re-inspection of items after completion of corrective measures.

1.13 GUARANTEE

- A. In addition to the requirements stated in the specifications, the Contractor must guarantee all equipment, materials and appurtenances installed by him to be free from all defects. Upon written notice from the Commissioner, the Contractor shall promptly correct all defects without additional cost to the City of New York. The Contractor shall adjust each part of the entire installation for proper working order.
- B. Reports are to be submitted to the Commissioner and adjustments repeated until the entire system is satisfactory. The Contractor must make good, at his own expense, any defects in materials or workmanship that may appear. The guarantee period shall be for one (1) year after final inspection and acceptance of the project.

PART 2.00 – PRODUCTS

2.01 QUALITY OF MATERIALS AND SUBSTITUTIONS

- A. Work performed under this Contract shall conform to all applicable laws, ordinances, regulations, codes (state, local and federal), and shall be subject to control of Commissioner.
- B. Wherever requirements of such laws, codes, regulations differ from the drawings or specifications, they shall take precedence over the drawings or specifications, and are expressly made part of the contract, except where the drawings or specifications are more stringent or require better materials, which would also be acceptable to the Commissioner (i.e., the more stringent code shall always apply).
- C. Any portion of work which is not subject to the approval of the Commissioner shall be provided in accordance with National Fire Protection Association requirements.
- D. Comply with applicable utility company rules and regulations.
- E. Comply with Occupational Safety and Health Act (OSHA) requirements.
- F. All equipment shall be equal to or exceed the minimum requirements of N.E.M.A, I.E.E.E. and Underwriters Laboratories.
- G. The electrical installation shall be in compliance with the requirements of New York City Electrical Code
- H. Seismic Restraints shall be provided per 2014 New York City Building Code including Section 1613 ASCE-7-10 as modified by New York City.

1.11 FEES, PERMITS AND ELECTRICAL INSPECTIONS

- A. The Contractor shall secure all permits and pay all fees required by local and state governing bodies necessary to complete the construction. Failure to investigate all applicable payments before the bid submission shall not constitute grounds for additional monies from the City of New York. The City of New York shall be furnished with all certificates of approval.
- B. Inspection shall be made by the Electrical Inspection Division, Building Inspection Department of the City of New York. This Contractor shall arrange for and pay associated fees for the required inspection.
- C. This Contractor shall prepare necessary drawings and pay associated fees to obtain required approval of Electric Service equipment. Service equipment and layout shall be approved by the Utility Company and the Commissioner of the Department of Buildings prior to fabrication of equipment.

1.12 INSPECTIONS, PROGRESS INSPECTIONS, SPECIAL INSPECTIONS AND TESTING

- A. This Contractor shall coordinate the following inspections, tests, progress inspections and special inspections as part of the contract work. This Contractor shall provide necessary labor to facilitate all tests required by special or progress inspections.
- B. Upon completion or partial completion of the permitted electrical work, inspections, progress inspections, special inspections and tests shall be conducted by approved agencies or special inspectors retained by the City of New York and qualified to conduct such inspections and tests per Rules of the City of New York, Chapter 100, subchapter A. Inspections and progress inspections shall be performed in compliance with Section BC 110 of the New York City Building Code and Chapter 5000 of the New York City Energy Conservation Code (1 RCNY §5000-01). Special Inspections shall be performed in compliance with Sections BC 1704 and BC 1707 of the New York City Building Code for all electrical systems. Refer to Article 116 of Chapter 1 of Title 28 of the Administrative Code for additional provisions related to inspections.
- C. Special Inspections of electrical systems shall include the following as applicable to the system:

indicating thereon all switchboards, conduit banks, transformers, starters, panels, access panels, etc. plus structural and architectural background details. The Electrical Contractor shall then deliver to the Sub-Contractors for HVAC and Plumbing the sepias for inclusion of their work. The areas where the Electrical Contractor shall prepare the base drawings shall include but not be limited to the following spaces.

1. Electric Service Room.
2. Electric and Telephone Closets.
3. Emergency Generator Room.
4. As required to indicate routing for all feeders, control conduits, empty conduit systems, and location of all required access panels.

D. At the completion of this phase, the Contractor shall hold a coordination meeting with the other Sub-Contractors to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the work. If the contractors are unable to reach agreement on a matter of interference among the mechanical trades, the matter shall be submitted to the A/E for his binding decision. After the set of sepias has been coordinated and all necessary changes have been made, each Sub-Contractor shall sign the drawings, attesting to his agreement that all work is clear.

E. When any shop drawings, have not been approved by the Commissioner, the Sub-Contractors shall revise and resubmit shop drawings as required until the submission is approved by the Commissioner at no additional cost to the City of New York.

1.09 OPERATION, MAINTENANCE MANUALS AND INSTRUCTIONS

A. Furnish to the A/E for each item listed below five (5) bound and indexed copies of the final approved installation, operations and maintenance manuals.

1. Engine Generator Set.
2. Lighting Control System including time clocks, occupancy sensors, etc.
3. Smoke detection system.
4. CCTV System.

B. Manual Contents:

1. The manual shall provide comprehensive detailed information on the approved installation, operation and use, troubleshooting, parts list, lubricating and periodic maintenance, together with the source of replacement parts and service for the items of equipment and the systems covered, including mechanical equipment, devices and systems.
2. Where items of equipment or systems work in conjunction with one another, the interconnections shall be shown on a single sheet, folded out if necessary. A schematic wiring diagram and a description of operation shall be included.
3. Where separate items of equipment specified herein are combined into a single sealed self-contained unit, the drawings and required data shall treat each item of equipment in such self-contained unit as separate items. Referring to such self-contained unit as one item of equipment will not be acceptable.

C. At the completion of work, the Contractor shall instruct the employees who will have charge of the equipment in the care, adjustment and operation of each piece of equipment. Instruction shall be by competent representatives of the manufacturers involved with adequate time allowed for complete coverage of all owning and operating procedures.

D. In addition, the Contract shall leave with such employees printed instructions covering the operation and required maintenance of each particular piece of equipment. Instructions shall be bound and titled and submitted to the Commissioner for approval. Submit five (5) sets.

1.10 CODES AND STANDARDS

- C. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
- D. Submittals shall be marked to show specification reference, including the section and paragraph numbers.
- E. Submit each section separately and include the following:
 - 1. Information which conforms to contract requirements. Include the manufacture's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Submittals on all systems shall be complete with sequence of operation indicating intended function and applicable capacities, sizes, ratings, etc. indicating compliance with design.
 - 3. Submittals on all equipment shall be complete with all power and control wiring diagrams.
 - 4. Name, manufacturer, catalogue number, and finish of the following devices and appurtenances shall be submitted in list form for approval, unless otherwise directed.
 - a. Cover Plates.
 - b. Each Receptacle Type.
 - c. Each Switch Type.
 - d. Each Special Outlet Type.
 - e. Conduit and Fittings Indicating Application.
 - f. Each Outlet Boxes Type Indicating Application.
 - g. Each Wire and Cable Type Indicating Application.
 - h. Grounding System Hardware.
 - i. Each Lamp Type Indicating Application.
 - 5. Submit drawings for approval indicating compliance with Seismic design per the requirements of these specifications.
- F. Submit as directed for items called for in specifications; samples of the materials which the manufacturer will actually ship. Materials shall be submitted for approval after award of contract and be properly labeled or identified.

1.08 SHOP DRAWINGS AND COMPOSITE DRAWINGS

- A. The Contractor shall promptly prepare and submit all shop drawings required by the specifications, contract and contract drawings, also all incidental shop drawings required for the proper performance of the work. The shop drawings shall illustrate fully the requirements of the specifications and the contract drawings, and shall accurately show quantities, kind of materials, method of assembly and all data required for fabrication, erection and installation. The relationship to adjoining work, whether furnished under other subdivisions of this contract or by other contractors, shall be properly shown.
- B. The Contractor shall be responsible for coordinating the installation work of all the Mechanical Sub-Contractors (HVAC, Plumbing and Electrical Work) by means of composite shop drawings as specified herein.
- C. The composite shop drawings shall be constituted in the following manner: HVAC Sub-Contractor shall prepare a set of reproducible or Auto Cad drawing files to the scale of $3/8" = 1'-0"$, indicating thereon all ductwork, major piping, plus structural and architectural background details. He shall deliver this set to the Sub-Contractor for Plumbing who will draw his work to scale on the reproducible or Auto Cad drawing files. Then the contractor shall deliver the set to the Contractor for Electrical Work who will superimpose his work on the drawings. The specified order in which the Sub-Contractors impose their work on the sepias is not intended to grant priority to any one Sub-Contractor in the allocation of space. In areas which have no HVAC work, or minimal HVAC work, Electrical Contractor shall prepare a set of reproducible or Auto Cad drawing files drawn to the scale of $3/8" = 1'-0"$,

1.03 DEFINITIONS

- A. The following definitions of terms and expressions used in this Section are in addition to listing given in General Conditions:
1. "Herein" shall mean the contents of a particular section where this term appears.
 2. "Scheduled" shall mean "as scheduled on contract drawings".
 3. "Concealed", where used in connection with conduit and wiring and accessories, shall mean that they are hidden from sight, as in trenches, chases, furred spaces, pipe shafts or hung ceilings.
 4. "Exposed", where used in conjunction with conduit and wiring and accessories, shall mean that they are not "concealed" as defined herein above.
 5. "Conduit" or "wiring" includes, in addition to conduit and wire also fittings, outlet boxes, pull boxes, hangers, and other accessories which comprise a system.
 6. "Singular Number": In all cases where a device or part of the equipment or system is herein referred to in the singular number (such as lighting fixture, fire alarm pull station, etc.), it is intended that such reference shall apply to as many such items as are required to complete the installation.
 7. "Remove" shall mean "remove from site" unless otherwise noted.

1.04 SITE INSPECTION

- A. All bidders on this work shall visit the job site and become thoroughly familiar with the conditions under which the work will be performed. The submission of a proposal shall be construed as evidence that the bidder has visited the site and has knowledge of site conditions. Any later claim for extra payment because of difficulties encountered will not be allowed.

1.05 CARE OF WORK AND SAFEGUARDS

- A. Contractor shall protect the work from damage by any cause until it is completed and accepted by the City of New York.
- B. The Contractor shall protect from damage any underground service or structure exposed by the execution of this work.
- C. Any damaged property resulting from work performed either by this Contractor, his subcontractors, or anyone in his employ shall be repaired and restored to its original state at no cost to the City of New York.

1.06 SCHEDULE OF WORK

- A. Schedule all work to conform to the job progress schedule as submitted to and approved by the Commissioner.

1.07 SUBMITTALS

- A. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings, operation, maintenance manuals and instructions and other data necessary to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall legible and shall clearly identify equipment being submitted.

SECTION 26 0500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, hoisting and rigging, scaffolding and services necessary to complete the Electrical Work as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Equipment supports and miscellaneous steel for electrical equipment including seismic restraints per applicable code.
 - 2. Underground telephone raceways.
 - 3. Electric Service and Utility Company metering equipment.
 - 4. Complete 120/208 volt light and power distribution system, including emergency, legally required, and optional standby systems, and all distribution switchboards and panelboards.
 - 5. Lighting fixtures, lamps, convenience outlet systems, and miscellaneous wiring devices.
 - 6. Smoke Detection System.
 - 7. Motor power wiring.
 - 8. Miscellaneous electrical equipment and systems, unless otherwise noted.
 - 9. Telephone and miscellaneous empty conduit systems.
 - 10. Excavation and backfill together with all required barricades.
 - 11. Lighting panels and power panels.
 - 12. Balancing loads.
 - 13. Grounding system.
 - 14. Sealing of sleeves and other electrical openings.
 - 15. Cable TV system wiring and conduits to telephone/data room.
 - 16. Emergency generator and controls.
 - 17. Lightning protection system.
 - 18. Lighting control system.
 - 19. Temporary electrical facilities.
 - 20. Access doors in general construction.
 - 21. Hoisting, rigging and scaffolding.
 - 22. All necessary permits, certificates agency approvals and related fees.
 - 23. Card Access Control System
 - 24. Intercom System
 - 25. House Watch System
 - 26. Door Annunciator System
 - 27. Coordinate Progress and Special Inspections for all work installed by this contractor per New York City Building Code, Section 110.
 - 28. Acceptance Testing as required by New York City Building Codes.

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- B. As described in this section, all piping systems shall be tested. Each section tested shall be slowly filled with water. Care shall be taken to expel all air from pipes. The use of any chemicals, any "StopLeak" compounds, any mastic, or any other temporary means shall not be used for repairing leaks during or subsequent to these tests.
- C. Geothermal "U Bend" Piping and Circuit Testing
1. Prior to insertion of the loop in the bore hole, the well drilling Subcontractor shall confirm that the loop has pressurized by the factory before installation.
 2. After the loop has been installed in the borehole and then again after loops are connected to circuit piping, the following steps shall be followed:
 - a. Gradually hydraulically pressurize to 100psi, and maintain test pressure for (3) hours. During initial expansion phase, polyethylene pipe will expand slightly. Additional water will be required to maintain pressure. It is not necessary to monitor the amount of water added during the initial expansion phase.
 - b. Immediately following the initial expansion phase, reduce test pressure by 10 PSI to 90 PSI, and stop adding water. If test pressure remains above 86 PSI for (1) hour, no leakage is indicated. If test fails the engineer will decide if test may be repeated or test failure requires specific identification of a leak.
 - c. After "U Bend" is circuited to horizontal piping. Entire circuit shall be tested in the same method as described above for loops.
 - d. Circuits will not be backfilled until successfully passing pressure testing.
- D. Final Assembled Well Field Test
1. The well field shall be cleaned as described in Section 3.8 prior to final well field testing.
 2. Final assembled well field shall be hydrostatically pressure tested at 150% of the system design pressure.
 3. Add makeup water gradually to maintain the test pressure for 4 hrs.
 4. Reduce test pressure by 10psi and monitor pressure for 1 hr.
 5. Pass/Fail Criteria – If no visual leak is and pressure during the test phase remains steady (within 5% of test phase pressure) for the 1hr test period, a passing test is indicated.

END OF SECTION 239900

polyethylene tubing shall be used as the tremi grout pipe. The tremi grout pipe shall be attached to the u-bend heat exchanger before it is lowered into the ground.

2. Heat exchanger field is expected to operate below freezing in a rock formation, high solids bentonite based grouts shall be used.
3. Grouting procedures to be followed:
 - a. Monitor the grouting operation to ensure grout is being adequately mixed in correct proportions and that the viscosity is adequate for pumping down the borehole.
 - b. Through the course of the project, three sample specimens shall be taken of the mixed grouting material. These samples shall be sent to an independent lab, an analysis shall be performed to verify proper thermal performance (which can be equated back to the other performance characteristics) with a report being sent to the entity requesting the analysis. The Subcontractor can submit these reports to the engineer of record to verify compliance with the installation specifications. The engineer can utilize these reports to verify that the specified conductivity is achieved and to help verify that the system will perform according to design.
 - c. The Subcontractor should have spare grout pipes, hoses, and fittings, readily available on site.
 - d. A screw type pump or a piston pump shall be used to pump grouts down the borehole.
 - e. A 3 to 4 inch inside diameter suction line and a 1 to 2 inch discharge line shall be used.

3.07 CLEANING OF GEOTHERMAL WELL FIELD

- A. Extreme care shall be exercised during construction to prevent all dirt and other foreign matter from entering the pipe or other parts of the system. Pipe stored on the project to have the open ends capped and equipment to have all openings fully protected. Before erection, each piece of pipe, fittings, or valve to be visually examined and all dirt remove.
- B. After system is complete, the Subcontractor shall first fill the piping loop and all runouts with clear water. For this purpose, the supply and return runouts shall be temporarily connected together at bypass. The loop water shall be circulated for one hour with make up water open and drain open to accomplish initial flushing of the system.
- C. The loop water shall be circulated through the geothermal piping with a high capacity charging station pump and a minimum flow rate of two (2) feet per second shall be maintained allowing all trapped air to be purged from the system.
- D. Notice shall be given to the engineer by The Subcontractor of scheduling this cleaning operation. If the representative of the owner deems it necessary, the cleaning operation shall be repeated.
- E. The Subcontractor shall not add any water treatment chemicals, or at any time "stop leak" compounds to the system.

3.08 PRESSURE TEST OF BOREHOLES, CIRCUITS AND GEOTHERMAL WELL FIELD

- A. The Subcontractor shall provide all necessary equipment and shall perform all work required in connection with all piping system tests. The Subcontractor shall be responsible for testing the piping that was installed under their contract as delineated on the Plans.

1. All excavation, trenching, drilling, casing, pumping, backfilling, and work associated with the installation of below grade horizontal and vertical geothermal piping shall be by The Subcontractor.
2. The vertical boreholes shall be drilled no closer than 20 feet apart and shall, in the case of wet holes, be held open by a "mud" casing or steel casing so that the piping can be inserted. The piping shall be tested in accordance with other sections of this specification prior to insertion. Loops must be installed from or by a mechanical device, so that the pipe is not rolled out on the ground before insertion.
3. Fusion elbows should only be used at the borehole seal if the loop tubing cannot be curved on a radius no less than 36 inches. When elbows are utilized, the bore hole casing is to be cut off at least 12 inches below the bend, and that the elbows and connecting lateral runs never come nearer than 48 inches to the final grade. Elbows must be lower than all remaining piping on the system to eliminate air entrapment at the elbow. All polyethylene pipes should be supported before and during backfill, with wood or Styrofoam.
4. The piping shall be capped and protected until such time that it is connected to the manifold piping.
5. Supply and return pipes must be a minimum of four inches apart in their respective trenches.
6. Approved borehole seals should be tightened to manufacturer's specifications.
7. All Foundation Penetrations are to be minimum 48" below grade, and through a core drilled hole or a cast sleeve of either Metal or Plastic Construction subject to the engineer's review. The sleeve is to be properly cemented into the foundation and sealed with Link Seal or other approved method. Subcontractor is to coordinate all penetration work with the contractor.
8. All lateral pipes from Bore Holes through Building Penetration will be sealed with a Link Seal fitting or approved equal. All penetrations must meet the requirements of the structural engineers requirements.
9. The entire piping system shall be pressure tested in accordance with other sections of this specification before any backfilling of trench is permitted.
10. The system must be power flushed prior to final fill. A minimum flow rate of 2 feet per second must be achieved and maintained for 20 minutes to eliminate trapped air and debris from piping. The entrapment of air in the earth system will severely impede the system performance. Extreme care must be taken when flushing the system.
11. Backfilling of the trenching may be performed after the system lateral piping has been successfully tested, charged, and the engineer, at his discretion, has inspected the installation.
12. The Subcontractor shall mark all buried pipe with tracer wire and underground "warning tape" at a depth of 24-inches. Tape shall be specifically marked for underground geothermal piping, and have integral wires, foil back, or other means to enable detection by a metal detector when the tape is buried up to (3) feet deep. The metallic core shall be encased in a protective jacket or provided with other means to protect it from corrosion.

C. GROUTING (WELL / CASING)

1. Boreholes in vertical heat exchangers shall be tremi grouted. Grouting of vertical heat exchangers shall be done in accordance with the latest State jurisdictional requirements and IGSHPA standards. Grouting shall immediately follow the completion of drilling and installation of each heat exchanger. A large capacity grout mixer / separate holding tank are required and a minimum of 1" diameter

- B. Any excess excavated material shall be removed off site. Distributing material on site will only be allowed with specific approval by the owner.
- C. The Subcontractor shall not deposit drilling waste and water within any existing stream, or in any manner, which violates local, state, and Federal laws and regulations. The disposal method of all drilling waste and water must be acceptable to the engineer and owner.

3.06 INSTALLATION

A. TRENCH EXCAVATION

- 1. Perform all excavation of every description and of whatever substances encountered, to the depths required or indicated on the drawings, in accordance with "Safety and Health Standards, Subpart P - Excavations, Trenches, and Shoring" of OSHA.
- 2. Grade as necessary to prevent surface water from flowing into trenches or other excavations, and remove any water accumulating therein by pumping or by other acceptable method.
- 3. Where the bottom of the trench is found to be unstable or to include ashes, cinders, all types of refuse, organic material, or large pieces of inorganic material, which in the judgment of the engineer is unsuitable, should be removed to a minimum of 12 inches below the pipe.
- 4. Backfill trench with selected bedding material and compact to provide uniform and continuous bearing for the pipe. Dispose of the unsuitable material. Rocks greater than 2", organic material, and construction debris is not acceptable for use as backfill.
- 5. Compaction requirements are as stated below or as directed by Architect:
 - a. Fill in trenches and parking lot and into the building is to be treated as structural fill and mechanically compacted.
 - b. Compaction requirement of 95% as per ASTM D698-Standard Proctor.
 - c. Subcontractor to provide 3rd party testing of backfill compaction every 400sf of installed backfill.
 - d. Maximum lift = 12 inches
- 6. Shoring Requirements: Perform all shoring and sheeting that is required to protect the excavation and to safeguard employees in accordance with OSHA. Widen excavation to provide for space occupied by shoring and sheeting as required. Shoring shall meet the requirements of all applicable codes.
- 7. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees Fahrenheit.
- 8. Dewatering: Do not allow water to accumulate in excavations. Prevent surface water and subsurface water or groundwater from flowing into excavations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations, adjacent buildings, and other construction areas. If there is potential for surface water or groundwater to enter the trench during construction, it is recommended that the piping be filled with water to prevent buoyancy.

B. GEOTHERMAL PIPING INSTALLATION

- C. Or approved equal.

2.10 INSULATION

- A. Insulation – provide insulation of all exposed piping in crawlspace and in the mechanical room as per division 23 and mechanical and plumbing drawings.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Prior to the start of the excavation for installation of the lateral piping and vertical borehole drilling, an effort shall be made to determine whether any underground lines including, but not limited to: sewer, telephone, water, fuel, and electric lines will be encountered. It is The Subcontractor's responsibility to call New York's One Call System to determine if any utilities are located in the proposed well field system site. The Subcontractor shall engage a specialized firm to perform an underground scan to located all interferences. Proper supports and shoring shall be provided for any such existing conduits and/or piping.

3.02 MOBILIZATION / DEMOBILIZATION

- A. Mobilization shall consist of furnishing at the project site, labor, power, supplies, tools, equipment, and performing operations in connection with the completion of the geothermal well field system.
- B. Demobilization shall consist of the removal from the construction site of all plant, equipment, supplies, and personnel after completion of the work including the cleanup of all rubbish, litter, and waste materials generated by The Subcontractor's activities.

3.03 PRE-DRILLING DECONTAMINATION PROCEDURES

- A. Prior to the arrival on site, the drilling rig, rods, tools, and bits shall be clean and free from potential contaminants, such as leaks, excessive grease, oils, gasoline, or other substances which could be constructed as such.
- B. Remove and replace warped, bowed, or otherwise damaged drilling equipment.

3.04 RUNOFF

- A. The Subcontractor must utilize his pre approved Sediment and Erosion Plan to contain and remove off-site any drilling, grouting, and piping runoff as a result of The Subcontractor's work. The disposal of this discharge in the local sewer is strictly prohibited. Collection into a basin with potential for the runoff on the city streets shall not be permitted. Any drilling runoff, of a continuous nature, going to a surface water body or pond may require a National Pollutant Discharge Elimination Permit (NPDEP). The Subcontractor shall be responsible to contact the State DEP office to procure such permit.
- B. In the event of damage to the Sediment and Erosion provisions such as but not limited to: basins, silt fencing, plantings, and dams, The Subcontractor shall make all repairs within a 24 hour period. Failure to repair the system back to its design intent may result in fines levied against The Subcontractor by the NYSDEC & NYCDOT.

3.05 MATERIAL DISPOSAL

- A. Any trees, wood or tree roots shall be chipped and removed from the site.

- C. Manifold shall be wall mounted on uni strut brackets. Subcontractor to provide shop drawing of mounting prior to assembly for engineer approval.
 - 1. Unistrut to be 1 1/4" minimum, 14 ga. Conforming with ASTM-A1011 GR33
 - 2. All concrete anchors and wall anchors shall be installed as per manufactures recommendations and be of appropriate capacity for the installation.
 - 3. Alternative manifold materials or assemblies only permitted with Engineers approval.
- D. P/T Plugs shall be constructed of solid brass and have dual seal core of nodel, rated for up to 3500F for water. Plugs shall be zero leakage rated for vacuum up to 1000psi. Probes shall be capable of receiving temperature and or pressure probes.
- E. Flow meter to be chemically resistant with shielded borosilicate glass with 316 SS internal components and an operating range of 0-20 GPM. Maximum increments to be 2 GPM, minimum operating pressure to be 100 psig with a minimum operating temperature range of 33°F - 125°F. Fittings to be compatible with PVC & CPVC. King 7650 Series 65W Model: 765-2-3-2-1 or approved equivalent. Provide full union installation.
- F. Branch and service saddles shall be molded out of high density polyethylene resins in accordance with the requirements of ASTM 3261.
- G. Valves shall comply with requirements of Section 2.4 of this specification.
- H. Approved Manufacturers
 - 1. Phoenix Energy Supply (315) 253-3720
 - 2. Approved Equal

2.07 CASING

- A. All permanently installed casing shall be steel.

2.08 BACKFILL

- A. Provide proper compaction equipment to properly compact backfill.
- B. Sand backfill around geothermal piping as indicated on drawings shall be environmentally clean sand with the following gradation:

Sieve No.	Percentage Passing (%)
4	100
10	90-100
40	40-70
200	0-5

2.09 WALL SLEEVES

- A. Link Seal Modular Seal: Model C or L type, Model LS-275-CS-3
- B. Core Drill Holes as pre structural and architectural requirements.

below. The bags of sand shall be kept dry at all times and stored on a pallet. Sand that has become wet should not be used, as this will increase the water/cement ratio of the grout.

Sieve No. (Size, mm)	Percentage Passing (%)
8 (2360)	100
16 (1180)	95-100
30 (595)	55-80
50 (297)	30-55
100 (149)	10-30
200 (75)	0-10

2.04 VALVES

A. Butterfly Valves

1. Butterfly Valves shall be full port flow with EPDM liner and wafer type disc
2. The disc shall be ductile iron with electrolytic nickel coating. The stem shall be one piece 316 stainless steel with "O" ring seals and self lubricating corrosion resistant bearings. The body shall be cast iron epoxy coated.
3. Valves 3 inches to 6 inches shall have lever type with 10 degree notched throttling plate. Valves 8 inches and larger shall have enclosed heavy duty hand wheel, worm gear operation.
4. All valves shall be suitable for installation between any type of 125 or 150 pounds ANSI flange.
5. The working pressure and manufacturer's name shall be cast on the body of each valve

B. Approved Manufactures

1. Milwaukee Valve Company
2. NIBCO
3. Jenkins
4. Hammond Valve Company

2.05 HEAT TRANSFER FLUID

- A. The geothermal heat transfer fluid shall be water and 20% food grade ethylene glycol.
- B. The pH of water shall be between 6 and 7.5.
- C. As manufactured by Huntsman International (Woodlands , TX), or approved equal.

2.06 GEOTHERMAL MANIFOLD

- A. The Subcontractor shall follow all manufacturers' recommendations for the installation of the geothermal manifold.
- B. Manifold construction and installation shall conform to all applicable codes.

1. The approved methods of heat fusion are Butt Fusion, Socket Fusion, and Electro Fusion. All fusion techniques must be approved by the manufacturer of the material being provided. *Under no circumstances shall any mechanically coupled joints be installed underground.*
2. The Subcontractor shall follow in strict accordance the "Pipe Joining Methods" as described in the IGSHPA Installation Guide and shall be deemed to be included in the contract as a part, therefore, the same as though herein written out in full.
3. Approved Manufacturers
4. McElroy Manufacturing Company
5. Vanguard Plastics Company
6. Charter Plastics, Inc.
7. CPCHEM Performance Pipe
8. Drisco Pipe Company
- D. Black Steel Pipe and Fittings
 1. Pipe and fittings shall comply with the most current revision of ASTM A 120.

2.03 GROUT

- A. Engineered low permeability high thermal conductive grout, Therm ex Grout by Wyo ben or approved equal.
 1. Grout shall meet the following Physical Characteristics:
 - a. Thermal Conductivity: 1.2 Btu/hr-ft.-oF
 - b. Permeability: less than 6.0×10^{-8}
 - c. Percent Solids: 71 %
 - d. Grout Weight: 15.2 lb/gal
 - e. Unit Yield: 41.5 gal/unit
 - f. Mix:
 - 1) Water - 22 gallons
 - 2) Grout - 50lb
 - 3) Silica Sand - 400lbs
 2. Water - The mixing water shall be potable. Water with excessive impurities may affect the final properties of the grout and shall not be used.
 3. Silica Sand - The silica sand shall conform to ASTM C 33 in terms of soundness and absence of deleterious substances only. The particle size gradation shall conform to that in the table shown

- D. Heat Transfer Fluid
- E. Manifolds & Supports
- F. Casing
- G. Backfill
- H. Wall Sleeves
- I. Insulation

2.02 PIPING

A. High Density Polyethylene Piping (HDPE)

1. Pipe and fittings shall be manufactured based on polymers made with ethylene as the sole monomer, which meet the requirements of PE Type III for water distribution. PE Type III pipe shall have a 1,600 PSI Hydrostatic Design Basis at 73.4 degrees Fahrenheit, which is listed by the Plastics Pipe Institute (PPI) and ASTM D 2837. Piping shall be manufactured to outside diameters, wall thickness, and respective tolerances as specified in ASTM D 3035 and D 2447.
2. The piping shall be PE3608 or PE4710 (high density polyethylene) with minimum cell classification 355434C per ASTM D 3350 "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials". Resistance to environmental stress cracking is critical to long life expectancy. Therefore, as a more stringent requirement, the piping shall experience zero failures (F_0) after 5,000 hours under condition "C" (100% reagent @ 100°C) when tested in accordance with ASTM D 1693, "Standard Test Method for Environmental Stress Cracking of Ethylene Plastics".
3. Each pipe shall be permanently marked with the manufacturer's name, nominal size, pressure rating, relevant ASTM standards, cell classification number, and date of manufacture.
4. Each pipe and factory fitted U bend vertical heat exchangers shall be permanently indented marked with distance in feet from the U bend, with marking every 2 feet.
5. Under no circumstances will field fabrication of U bends for vertical loop piping be permitted.

B. Fittings

1. All fittings shall be manufactured from identical materials as pipe being furnished on project. Pressure rating of fittings shall be equal to that of pipe being furnished. The following standards shall be referenced:
 - a. Butt Fusion: ASTM D 3261
 - b. Socket Fusion: ASTM D 2683
 - c. Electro Fusion: ASTM F 1055
2. Each fitting shall be identified with the manufacturer's name, nominal size, pressure rating, relevant ASTM standards, and date of manufacture.

C. Joints

- D. Air space shall be filled with a silicone foam penetration seal to maintain both water and fire barrier between both sides of the floor or wall.
- E. All piping passing through exterior walls or subslab shall have opening around pipe sealed with modular mechanical type seals, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely watertight seal between the pipe and wall opening. The pipe to wall penetration closures shall be "links" as manufactured by Thunderline Corporation or approved equal.
- F. Where sleeves pass insulated pipes, the sleeves shall be large enough to pass the insulation.
- G. For all exposed uninsulated pipe, The Subcontractor shall provide execution plates. All plates shall be split ring type, nickel plated of the pipe size.
- H. Plates shall be provided where pipes run exposed through walls, floors, or ceiling located in finished areas of the building. All plates shall be spring clamp type that are chrome plated spun brass or plain pattern, and they shall be set right on the pipe and to the building surface.

1.20 CUTTING AND PATCHING

- A. Except where specified otherwise provide cutting, patching and refinishing work in accordance with the requirements of the General Construction Specifications. Horizontal chases shall not be cut into existing horizontal walls or partitions without approval of Engineer.
- B. Where concealed work proves to be defective during the guarantee period, The Subcontractor shall engage the services of trade that installed the original work to excavate, remove the walls, ceiling, or other required work. The Subcontractor shall correct the defective mechanical installation. The flatwork, landscape, walls, ceilings, etc. shall be replaced by the Subcontractor to match the adjacent finish. All costs involved in this phase of the work shall be borne by The Subcontractor.

1.21 SUPPORTING DEVICES

- A. Provide all supports, frames, braces, hangers, anchors, brackets, clamps, and similar items as indicated on the drawings, as herein described, and as necessary for the support and hanging or mounting of all piping and manifolds to be provided.

1.22 CONSTRUCTION FENCE

- A. The Subcontractor shall furnish and install a four (4) foot high construction safety fence to enclose the perimeter of the area of construction. Fence shall remain in place until work is complete.

PART 2 - PRODUCTS

2.01 SUMMARY OF PRODUCTS IN THIS SECTION

- A. Piping
- B. Grout
- C. Valves

days; and if material in question has been installed, the entire expense for removing and reinstalling shall be borne by The Subcontractor.

1.17 LAYOUT AND COORDINATION

- A. Lay out all work from approved building and property lines and benchmarks. Verify and be responsible for the correctness of all measurements in connection with work. Any changes made in major overall dimensions as shown which affect the work shall be approved by the engineer and recorded on as built drawings.
- B. Examine the Drawings of other trades and initiate cooperation and coordination of the Work with the work of other trades to insure that the work can be installed properly as designed and planned without interference with other work or delay.
- C. Offsets, bends or other items required by the work may not be shown due to the small scale of the Drawings; provide such offsets, bends or other items as required to meet the design intent.
- D. Install material and equipment as high as possible; at minimum, to clear the top of all doors, windows and other structural openings. Maintain maximum headroom and space conditions in every case. Where headroom or space conditions appear inadequate, notify the Architect before proceeding with the installation.
- E. Make reasonable modifications in the layout of the Work, as directed, to provide proper clearances or accessibility, or to prevent conflict with the work of other trades, at no increase in the contract sum.
- F. Cooperate fully with The Contractor in regard to location of mechanical equipment and work progress schedules.
- G. Issue such drawings to the other trades for coordination of their work. Where such drawings show deviations from the Contract Drawings or conflict with other trades, detail and submit such deviation or conflicts to the engineer for review.
- H. If work is installed before coordinating with all other trades and Owner's work, or so as to cause interference with the work of other trades, or so as not to provide proper access for maintenance or repair, make necessary changes in work to correct the condition at no cost to the owner.

1.18 SCAFFOLDING, RIGGING, AND HOISTING

- A. The Subcontractor shall furnished all scaffolding, rigging, hoisting and lifting services that shall be necessary to erect or deliver all equipment and apparatus into the premises. All equipment shall be constructed and maintained in a safe condition at all times. When no longer required, all equipment shall be removed from the premises.

1.19 SLEEVES, INSERTS, AND PLATES

- A. The Subcontractor shall provide, and he shall be held responsible for the location and maintaining in proper position all sleeves, inserts, and plates that are required for the work.
- B. If he fails to do so at the proper time during the construction period, all costs that are involved in cutting and patching of the work shall be borne by The Subcontractor, and the work shall be accomplished as directed by the engineer.
- C. All piping passing through floors, or interior walls shall have a one inch continuous air space between piping and opening.

- B. ASTM D 3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material.
- C. ASTM D 1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
- D. ASTM 2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
- E. The Building Code of New York.

1.13 PERMITS AND FEES

- A. The Subcontractor shall give all necessary notices, obtain all permits, pay all governmental taxes, fees and other costs in connection with his work. He shall file all necessary plans, and prepare all other documents including additional detailed plans that are required for compliance with all applicable laws, ordinances, rules and regulations.
- B. The Subcontractor shall include as part of his work, without extra cost to the owner, all labor, materials, services, equipment and drawings (in addition to the contract drawings and documents) which may be required to obtain any permits associated with his work and for compliance with all applicable laws, ordinances, rules and regulations.

1.14 CERTIFICATES

- A. The Subcontractor shall complete approval of all his work from the NYSDEC & NYCDOB. He shall pay all necessary fees for permits, tests, inspections and certificates, and he shall also prepare all drawings and documents, in addition to contract drawings, which may be required in order to secure approvals or permits for his trade.

1.15 OPERATING INSTRUCTIONS

- A. Upon completion of work and tests, and at a time mutually agreed to by The Subcontractor, Engineer, and Owner, operate all systems installed, in all parts, at The Subcontractor's expense for sufficient length of time (minimum of 3 working days), to demonstrate the mode of operation, maintenance procedures and definitely determine whether systems as a whole are in first class working condition. Defects and malfunctions that may develop during this period of operation shall be immediately corrected by The Subcontractor at his own expense, and systems placed in first class working condition before being finally turned over to Owner.
- B. Provide personnel and experienced manufacturer's personnel to assist and instruct Owner's authorized employees fully in operation, adjustment and maintenance of systems and equipment installed under this contract.
- C. The Subcontractor shall also furnish four sets of approved bound written type instructions for the operation, adjustment and maintenance of the entire system.
- D. The Subcontractor shall also furnish all piping diagrams to be located in the main mechanical equipment room.

1.16 INSPECTION BY THE ENGINEER

- A. All work and materials shall be accessible at all times for the inspection of the engineer. Any material not installed in a neat and workmanlike manner, or not in accordance with the contract drawings and specifications, shall, upon direction from the engineer, be removed from the premises within three (3)

- B. The superintendent shall have the full authority to act for the Subcontractor in matters relating to the work.
- C. The Subcontractor shall lay out his own work, and he shall be held fully responsible for all measurements executed by him. He shall verify all dimensions and sizes shown on the contract drawings, and he shall be held fully responsible for errors resulting from his failure to exercise these precautions.
- D. The responsible party providing superintendence for and on behalf of the Subcontractor shall be fully skilled, knowledgeable, and competent in the trade he is supervising. He shall have had extensive and substantial experience in the reading, comprehension, and interpretation of contract documents of this nature. He shall be competent to direct the tradesmen installing the work described in these documents.

1.10 SCHEDULING

- A. The Subcontractor shall give special attention to the progress schedules set up for the various phases of the work. The work must be performed at a satisfactory pace to remain within the limits designated in the schedule.
- B. The Subcontractor shall provide a sufficient number of skilled and experienced workmen to permit the project to progress as scheduled. The ordering and delivery of all equipment must be arranged to suit the progress schedule. Any delay to the progress of the work incurred by substitutions of material and equipment will not be acceptable. Failure to order material on a timely basis or release material on a timely basis shall not give rise to a claim for extra changes by the Subcontractor or give rise to the substitution of material.
- C. The Subcontractor shall notify the engineer of any cleaning, flushing, or testing of the system in writing with a minimum of (5) days notice.

1.11 CONTRACT DRAWINGS

- A. The contract drawings are diagrammatic and indicate the general arrangement of all systems and work included in the contract. The contract drawings are not to be scaled. The architectural contract drawings and details together with the other contract documents shall be examined for all dimensional information.
- B. The Subcontractor shall follow the contract drawings in laying out his work, and he shall also check the contract drawings of the other trades to verify spaces in which his work shall be provided.
- C. The Subcontractor shall prepare detailed drawings and sections that show the exact location of all bore holes and major equipment. These detailed drawings shall be at a suitable scale, not less than 1/4"=1'0". He shall maintain required clearance for operation of valves, fill stations, flushing ports, etc. Where the clearance space appears inadequate, the engineer shall be notified in writing before the Subcontractor proceeds with the installation.
- D. The Subcontractor shall, without additional costs to the owner, make reasonable modifications in the layout of his work in order to prevent conflicts with the work of other trades or for the proper execution of his work.

1.12 REFERENCED STANDARDS

- A. International Ground Source Heat Pump Association (IGSHPA) Standard for Installation of Ground Source Heat Pump Systems.

1.05 DEFINITIONS

- A. "Concealed" means hidden from sight, in trenches, chases, furred spaces, shafts, hung ceilings, embedded in construction, or in crawl spaces.
- B. "Exposed" means not installed underground or "concealed" as defined above.
- C. "Days" means the 24 hour increment of the normal work week.
- D. "Excavation" means the removal of material encountered to contract level and subsequent loading, transporting, and legal disposal of such.

1.06 EXAMINATION OF SITE

- A. The Subcontractor shall visit the site before he submits his proposal. He shall examine all existing conditions that will affect his work and base his proposal on any additional complexities the project may incur due to site conditions. The submission of the proposal shall be considered evidence that this requirement has been fulfilled. No extra payment will be allowed for additional work made necessary by the failure to visit the site.

1.07 SUBSURFACE CONDITIONS

- A. The subsurface materials may consist of, from the surface downwards, unconsolidated sand, silt, clay, gravel or aquifers to the full depth of drilling. The Subcontractor shall rely on his previous experience in the subsurface conditions of the area when preparing his proposal.
- B. If The Subcontractor does not have experience in the geological area of the project and no test bore information is available, he shall not seek additional compensation from the owner for incorrect subsurface condition assumptions that he may have based his proposal on.
- C. The Subcontractor, within the reasonable limits of good construction practice, shall make modifications to his work for unforeseen conditions/requirements such as but not limited to, existing utilities, regulatory requirements, subsurface conditions, and site work without seeking additional compensation from the owner.
- D. The Owner makes no predictions or representations regarding the character or extent of soil, rock, or other subsurface conditions to be encountered during the work. The Subcontractor shall make its own deductions of the subsurface conditions that may affect the methods or cost of construction of the work hereunder, and agrees that it will make no claims for damages or compensations.

1.08 WATER SUPPLY

- A. The Subcontractor shall coordinate with the owner an adequate water supply to support the resources utilized for drilling operations. The water supply point of connection shall remain accessible to The Subcontractor throughout the duration of the project.
- B. The Subcontractor shall supply all hoses and other temporary extensions and connections required to distribute water to support drilling, grouting, flushing, filling, and cleaning the system.

1.09 SUPERINTENDANCE

- A. The Subcontractor shall give his personal superintendence to the work, or he shall have a competent superintendent present on the site at all times during the construction of the work.

- b. Certified statement from the company listing the qualifications of the Company Field Advisor.
 - c. Services and each product for which authorization is given by the company, listed specifically for this project.
5. Fusion Welder Qualifications Data:
- a. Name of each person who will be performing the welding, their employer's name, business address, telephone number, home address, and social security number.
 - b. Copy of certifications referenced in Quality Assurance.
- C. Detailed Drill Logs: Detailed drilling logs shall contain the following information for each borehole:
- 1. Borehole number identification or grid location as shown on contract drawings
 - 2. Dates of drilling.
 - 3. Dates of grouting.
 - 4. Date of pressure test and results in accordance with methods described in this specification section.
 - 5. If any pressure tests fail, what action was taken to correct the problem.
 - 6. Final depth of borehole.
 - 7. Installed depth of HDPE piping.
 - 8. Total length and material of casing.
 - 9. Dates of circuiting.

1.04 WARRANTY

- A. The Subcontractor by his acceptance of the contract guarantees that all work installed shall be free from all defects in workmanship and materials and that all apparatus furnished by him shall develop the capacities and characteristics specified. He further guarantees that if, during a period of (5) years from the date of the certificate of completion and acceptance of the work, any such defects in workmanship, material or performance appear, such defects shall be remedied by him without cost to the owner.
- B. Manufacturer's Warranty
- 1. Minimum 50 Year warranty for all vertical loop HDPE pipe and factory installed or fabricated U bends.
 - 2. Minimum 25 Year warranty for all horizontal interconnecting pipe and fittings. Any material defects not caused by poor workmanship shall be unconditionally guaranteed by the manufacturer. This shall include all material and labor to replace the faulty piping.
 - 3. Minimum 12 Months (from date of startup) for all HDPE Manifolds including all material, heat fusion joints, brass fittings and valves. Any material defects not caused by poor workmanship shall be unconditionally guaranteed by the manufacturer. This shall include all material and labor to replace the faulty piping.

E. Schedule: Submit the proposed work completion schedule with completion dates, and a detailed breakdown of work category so that the Owner's representative is able to coordinate this Subcontractor's work with the work of other trades and subcontractors.

F. Warranty: Submit copy of specified warranty.

1.03 QUALITY CONTROL

A. Quality Assurance

1. Geothermal System Installer Qualifications: The firm performing geothermal work shall be properly trained in polyethylene pipe fusion techniques by IGSHPA or piping manufacturer, experienced in geothermal work, and shall have been regularly employed by a company performing geothermal work for a minimum of (3) years. Subcontractor shall be able to furnish proof of training, and references and contacts for previous jobs of size and scope comparable to the project under consideration.
2. Geothermal System Supervisor's Qualifications: The supervisor overseeing the geothermal work shall be properly trained in polyethylene pipe fusion techniques by IGSHPA or piping manufacturer, experienced in geothermal work, and shall have been regularly employed by a company performing geothermal work. Subcontractor shall be able to furnish proof of training.
3. Perform factory testing of factory fabricated equipment and material in accordance with ASTM Standards: ASTM D 3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material, ASTM D 1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics and ASTM 2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
4. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction.

B. Quality Control Submittals

1. Loop pressure test procedures and results. Procedures shall be approved prior to commencement of pressure test activities. Provide a (2) working day notification to the owner and/or engineer prior to conducting pressure tests.
2. Geothermal System Installer's Qualifications Data:
 - a. Name of firm who will be performing the geothermal work, their employer's name, business address, and telephone number.
 - b. Name and address of similar projects that firm has worked on.
 - c. Copy of installer's training for polyethylene pipe fusion techniques from IGSHPA or piping manufacturer.
3. Geothermal System Supervisor's Qualifications Data:
 - a. Name of person overseeing the geothermal work, their employer's name, business address, and telephone number.
4. Geothermal Field Advisor's Qualifications Data:
 - a. Name of person performing required service, their employer's name, business address, and telephone number.

SECTION 23 9900 - GEOTHERMAL WELL FIELD

PART 1 - GENERAL

1.01 PROJECT SUMMARY

- A. The project as specified in this section is for the installation of a closed loop geothermal HVAC well field. It consists of a total of ten (10) geothermal boreholes. One borehole is an existing bore which was utilized for a thermal response test, which has a 1-1/4" HDPE loop installed to 499.5' beneath grade surface. The remaining nine (9) boreholes will be constructed with 1-1/4" HDPE u bend loops as specified in this section, and be installed to a depth of approximately 450' beneath grade surface or to the top of bedrock, whichever is less. The boreholes shall be grouted the entire length with a thermally-enhanced bentonite grout. The boreholes shall be piped into trenches, being backfilled as specified, and run underground to a manifold located in the geothermal mechanical space inside of the building as shown in the mechanical drawings and on plan GT-101. The Subcontractor shall coordinate and provide all penetrations required to run mains to building mechanical room from the borefield. The Subcontractor shall coordinate manifold with the drawings and connection locations to the Mechanical Subcontractor's work as shown on the mechanical drawings.

1.02 SUBMITTALS

A. GENERAL REQUIREMENTS

1. As required in the project general conditions.

- B. Product Data: Provide manufacturer's catalog sheets, specifications, layout sketches and installation instruction for each item specified including but not limited to:

1. HDPE pipe and fittings.
2. Prefabricated manifolds, and headers.
3. Field fabricated manifold support
4. Valves
5. Heat transfer fluid
6. Grout material and mix design
7. Casing (if used)

- C. Methods: Submit method of drilling, trenching, and detailed drawings of the piping layout including horizontal piping, headers in the bore field, supply and return lines in the bore field.
- D. Sediment and Erosion: The Subcontractor shall submit a sediment and erosion plan to the commissioner's representative, architect and engineer. This plan should include the Subcontractor's proposed methods and details for containing and removing runoff created by the well drilling and piping installation. If directed by commissioner's representative, sediment and erosion plan shall also be submitted to local jurisdiction having authority, if necessary, for approval prior to any construction activity.

- A. Retain an independent testing agency to perform material testing as required. The Contractor shall provide any necessary assistance to the testing agency and provide the testing agency with the intended construction schedule at least one week prior to the start of construction.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Contractor is responsible for coordinating this work with other trades on-site.
- B. All work must be coordinated with the electric, gas, telephone/data, and cable utility companies and shall comply with all requirements, details, regulations, etc. of said companies.
- C. Identify and describe unexpected variations to subsoil conditions and the discovery of uncharted utilities.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials as recommended by the manufacturer to protect from damage.

1.08 PERMITS AND APPROVALS

- A. Contractor shall prepare and obtain all required permits prior to construction unless otherwise directed by Commissioner. Copies of all permits shall be supplied to the Commissioner prior to the commencement of work authorized by the permit.
- B. Connections with existing facilities shall be performed in accordance with the requirements of the Owner of the facility. The Contractor shall be required to comply with all such requirements, including securing all permits, and payment of all permit and/or connection fees.

1.09 PROJECT RECORD DOCUMENTS

- A. Upon completion of the work of this and related sections, the contractor shall provide the Commissioner with an as-built survey of all new water, sewer, electric and gas service lines. The data shall include elevations for all new utilities tied into established project benchmarks. The survey shall be provided in digital (AutoCAD DWG) and paper formats, and shall be signed and sealed by a New York State Licensed Professional Land Surveyor. This survey may be combined with other as-built survey requirements of site-work items, with the approval of the Commissioner. Marked-up design plans are not acceptable for the requirements of this section. All survey elevations shall be in North American Vertical Datum (NAVD88).

1.10 RELATED SECTIONS AND DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Project Specifications:
 - 1. Section 021000 - Protection of Existing Utilities
 - 2. Section 020110 - Protection of Existing Conditions
 - 3. Section 310000 - Earthwork

SECTION 33 0000 - OTHER UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Work of this section, as shown or specified, shall provide Other Utilities in accordance with the requirements of the Contract Documents. The Contractor must accept the site as-is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.

1.02 WORK INCLUDED

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, certificate costs, services, filing fees, testing costs, security, and all other associated or related items specified herein that are necessary and are required to complete the Work. Work elements shall include:
 - 1. Furnish labor, materials, services, equipment, and other necessary items required to excavate, install and backfill the piping, conduit, duct banks and manhole/pull box structures related to the on-site primary and secondary electrical service, telephone/data, and natural gas services in accordance with the Contract Documents.
 - 2. Refer to site electrical, telecom, and plumbing drawings for division of construction responsibility between site work contractor and utility companies.

1.03 QUALITY ASSURANCE

- A. Perform work in accordance with utility company and municipality requirements.
- B. Manufacturer's name and pressure rating must be marked on valve body.

1.04 SUBMITTALS

- A. No work shall be performed until shop drawings, if required, have been reviewed and accepted by the Commissioner.
- B. The Contractor must provide the following submittals to the Commissioner for approval prior to purchase of materials:
 - 1. Material Certificates: Submit materials certificate to the Commissioner which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein and applicable regulatory requirements.
 - 2. Product Warranty: Submit documentation of standard product warranty terms for all products pertaining to this section.
- C. Accurately record actual locations of all existing and newly installed utilities. Contractor shall provide the Commissioner with as-built documents within 30 days of project completion.

1.05 CONTRACTOR'S RESPONSIBILITIES

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

OTHER UTILITIES
33 0000 - 1

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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 City of New York.
- D. Tags. Remove all identification labels, trunk wrap, seals, and tags at final acceptance of the project.

END OF SECTION

4. Depending on the maximum allowable roof load, crane and place the pallets with the sedum blankets and distribute evenly across the surface to be covered.
5. Thoroughly moisten growing medium and base components of the system prior to placement of sedum blanket.
6. Layout and install the blanket per manufacturer's instruction. Use two (2) people to lift the blanket and lay it in the correct positions. Cut the blanket to size if necessary with manufacturers suggested tools.
7. Once everything is placed properly, fill any bare patches with 1 ½-inch thick layer of green roof substrate and clumps of plant material cut from the leftovers.
8. When finished, water the planted area thoroughly. Make sure that the growing medium is also watered well, enabling the roots of the sedum blanket to take hold of the growing medium immediately.
9. Comply with manufacturer's Maintenance Instruction immediately after installation.

3.05 AGGREGATE BALLAST OR ROOF-PAVER INSTALLATION

- A. Install strips/areas of stone/paver ballast for walkways and maintenance paths at all roof perimeter, building walls and penetrations (including drains) to act as vegetation barriers for the flashings as well as barriers to wind and fire and where indicated on Drawings.
- B. Install edge restraints as designated to separate the soil areas from stone/ paver strip areas.

3.06 PLACEMENT OF MISCELLANEOUS MATERIALS

- A. Fertilizer: See Section 329113 "Planting Soils" for fertilizer specification. Place organic fertilizer as required by soil analysis and manufacturer's instructions. Fertilizer application to be approved by the Commissioner and the City of New York's representative.
- B. Compost Tea: apply according to manufacturer's recommendations.
- C. Mycorrhizal treatments: apply according to manufacturer's recommendations.

3.07 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other area indicated.
 1. Organic mulch in planting areas: Apply 2"-3" average thickness of mulch over entire surface of planting area and finish level with adjacent finish grades. Do not place mulch within 3" of trunks or stems. Do not create "mulch volcano" at trunk bases.

3.08 TRAFFIC ACCESS

- A. The Contractor is strictly prohibited from tracking or driving over newly planted areas. Vehicular traffic routes must conform to pre-approved routing of construction operations.
- B. Restore areas disturbed by planting to achieve full healthy growth of plant materials.

3.09 CLEANING, PROTECTION, AND EXCESS MATERIALS

- 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.

- C. **Planting Balled & Burlapped Stock:** Prior to placing tree in planting hole, inspect all rootballs to determine if flare of trunk is improperly buried. If necessary, expose flare of trunk by removing excess fill on top of rootball. If rootball is set too low, carefully remove tree from planting hole and establish the correct finished grade so that trunk flare is visible and set balled and burlapped stick plumb with crown of properly exposed rootball 2" - 3" higher than specified finished grade. Remove burlap and twine from trunk to prevent girdling. Completely remove drum lacing and wire baskets. Fold down burlap from top third of rootball. Keep rootballs intact; plants with broken or damaged rootballs shall be rejected and immediately removed from the site. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.
1. **Backfilling:** After large shrubs have been placed in staked locations, and as directed by the Commissioner, backfill excavations with soil mix layers to levels shown on drawings. Backfill in 3 - 4" layers and consolidate each layer with water to eliminate voids and air pockets before placing subsequent layers. Continue until backfill has reached specified finished grade shown on the drawings. Water thoroughly when excavation is backfilled and continue watering until saturation.
 2. **Watering:** Flood all plants with water twice within the first 24 hours after planting.
 3. **Anti-desiccant:** Use anti-desiccant only if approved by the Commissioner and the City of New York. Spray anti-desiccant to provide adequate film over trunks, branches, stems, and foliage. If trees are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.
- D. **Planting Container Stock:** Plant container grown stock the same as specified for balled and burlapped stock, but remove containers completely with a cutter acceptable to the Commissioner.
1. **Root Pruning:** After removing plant from the container, the Contractor shall inspect the rootball for kinked, matted, or circling roots. If these conditions are present, the Contractor shall prune to remove cleanly any kinked, matted, or circling roots with sharp, clean hand pruners. The Contractor shall also scarify the sides of the rootball to prevent a rootbound condition.
 2. **Watering:** Flood all plants with water twice within the first 24 hours after planting.
- E. **Planting Bulbs and Groundcovers:** Plant bulbs concurrently with groundcover if season of planting permits. The Commissioner shall approve layout of bulbs. Plant bulbs to proper depth for species, place shoots upright. Provide 1 teaspoon of bonemeal per bulb mixed in the planting hole.
1. **Root Pruning:** After removing plant from the container, the Contractor shall inspect the rootball for kinked, matted, or circling roots. If these conditions are present, the Contractor shall prune to remove cleanly any kinked, matted, or circling roots with sharp, clean hand pruners. The Contractor shall also scarify the sides of the rootball to prevent a rootbound condition.
 2. Set out and space groundcover and plants as shown in drawings.
 3. Dig holes large enough to allow spreading of roots.
 4. Work soil around roots to eliminate air pockets and leave a small saucer indentation around plants to hold water.
 5. Water thoroughly after planting, do not cover crowns with wet soil.
 6. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.
- F. **Pre-Grown Sedum Blanket Installation:** All conditions of planting operations apply to the rooftop planting operations in addition to the following requirements. Place lightweight soil mix in accordance with Section 329113 - "Planting Soils." Care shall be taken to prevent any and all materials from becoming wind-borne during planting.
1. Before installation of the vegetation, verify the finished grade of the growing medium.
 2. Upon arrival of the sedum blankets, place pallets with sedum blankets in a shaded area. Make sure the blankets are cool to touch; if the blankets heated up in transport, unroll them on the ground and water to cool the blankets.
 3. Install sedum blankets on the day of delivery.

- F. After compaction remaining soil shall be placed at 1 inch greater than final grade and thoroughly watered or jetted over entire area. Low settled areas shall be filled with additional soil and re-wet to achieve uniform prescribed final grade.

3.03 FINE GRADING

- A. Prior to fine grading, the Contractor shall verify that the drainage system, planting soil mixes, and irrigation system have been accepted.
- B. Fine Grading: Set sufficient grade stakes for checking the finished grades. Grades shall be established with are accurate to 1/10th of a foot either way. Connect contours and spot elevations with an even slope. All grading will ensure positive drainage away from structures.
1. Fine grade planted areas to smooth, free-draining, even surfaces with fine texture.
 2. Refer to Item 3.2 for placement and compaction of lightweight soil mix.
 3. Maintenance and Restoration: Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to planting.

3.04 INSTALLATION OF TREES AND PLANTS

- A. Planting Preparation:
1. Maintain at all times during the planting operations at least one stockpile of planting soil mixture as specified in Section 329113 "Planting Soils" and as approved by the Commissioner and Soil Scientist.
 2. Protect new and existing site improvements from damage due to planting operations. Cover all installed pavement adjacent to planting bed openings with plastic to prevent infiltration of soil into open joints. Repair all damage and restore items to their original condition as approved by City of New York at no change in Contract Amount.
- B. Planting Bed Preparation for Trees: Install plants simultaneously with installation of plant soil mixes, see section 329113 "Planting Soils".
1. Planting Bed Base: Install drainage and green-roof components as per Section 329113 "Planting Soils".
 2. Tree and Large Shrub Staking and Layout: Layout and stake individual shrubs and obtain the Commissioner's acceptance of location and finish grade elevation prior to installation. After staking is accepted, place shrubs and trees for final review and acceptance by the Commissioner.
 3. For balled and burlapped plants (B&B) and container grown plants, excavate soil from plant pits to conform to the following:

<u>Size of Ball or Container</u>	<u>Diameter of Hole</u>
Up to 18 inch diameter	3x (times) diameter of ball or container
19 inch to 4 foot diameter	2x (times) diameter of ball or container
Greater than 4 foot diameter	1.5x (times) diameter of ball or container

4. Rootball Support: Provide appropriate soil immediately beneath the rootball or root mass so that the plants will not settle and will have the relationship to finish grade described below.
5. Obstructions: If obstructions or other conditions detrimental to healthy plant growth are encountered, notify the Commissioner immediately and request additional instructions. At Commissioner's direction and at no additional cost to the City of New York, plants shall be relocated to avoid the obstruction.
6. Planting Soil: Install soils, per Section 329113 "Planting Soils".
7. Shrub and Other Planting Layout: Locate and place all other plant material for approval by the Commissioner prior to installation.

- B. Compost Tea with Mycorrhizae: Provide compost tea containing Mycorrhizae for application after plant installation. The Commissioner to approve compost tea product and mixture, quantity and frequency of application.
- 2.05 MULCHES
 - A. See Section 329113 "Planting Soils" for Mulch specification.
- 2.06 EDGE RESTRAINTS
 - A. See Section 321400 "Unit Paving" for Edge Restraint specification.
- 2.07 AGGREGATE BALLAST
 - A. Aggregate Ballast: Washed, crushed stone or smooth stone that will withstand weather exposure without significant deterioration and will not contribute to membrane degradation, of the following size based on design requirements:
 - 1. Size: ASTM D 448, Size: Gravel Bin 30 Granite #57
- 2.08 MISCELLANEOUS MATERIALS
 - A. 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 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 the Commissioner in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means that 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.
- 3.02 PLACEMENT OF PLANTING SOIL MIXTURE
 - A. Refer to Section 329113 "Planting Soils".
 - B. Refer to "Installation of Trees and Plants" for instruction regarding simultaneous installation of planting soil mixes and plant materials.
 - C. Soils shall be placed carefully to avoid damage or displacement of other materials such as walls, paving, drainage components, filter fabric, and roofing membrane.
 - D. Soils shall be placed to within 1 inch greater than final grade or to a depth of no greater than 8 inches and compacted as described in 3.2E below. For final grades less than 8 inches, only one round of compaction shall be performed and remaining soil loosely placed such that top of soil exceeds final grade by 1 inch (see 3.2F below). For final grades greater than 8 inches, place soil at no greater than 6 inches and repeat.
 - E. Compaction shall be performed with a 200 – 300 lb. landscape roller or lightly compacted with a hand held mechanical compactor to achieve a 50 – 60 % compaction as determined by ASTM D1557.

shall be reasonably moist to indicate watering prior to delivery and during storage, and shall be free from damage in handling.

- J. Tree stabilization: Install stabilization as follows unless otherwise indicated:
 - 1. Stabilization (staking or guying) of trees shall only be permitted in the event that site conditions or conditions of the tree are such that the tree is anticipated to be unstable, unless otherwise indicated on plans. The contractor shall submit, in writing, for approval of the Commissioner, a request to stabilize any tree not indicated to be staked on drawings. The submission shall include the type and location of each tree, the reason why stabilization is requested, and the stabilization methods to be employed.
 - 2. All Bare-Root Trees (if specified) shall be staked for the first year only and then removed.

2.02 PRE-GROWN VEGETATION BLANKETS

- A. Basis of Design: Textile-based vegetation carrier of 100% biodegradable coco mat filled with planting substrate and pre-cultivated with an even layer of low-profile, drought tolerant vegetation suitable for installation in Zones 6-7 and hardy to Zones 4-5 of the USDA Hardiness Zone Map, as manufactured by Sempergreen USA, Culpepper VA, 540-399-5055, or approved equal.
 - 1. Mix Type A: Standard Sempergreen Sedum Blanket
 - 2. Mix Type B: Yellow/Blue Sempergreen Sedum Blanket
 - 3. Mix Type C: Red Sempergreen Sedum Blanket
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - 1. Sempergreen USA
17416 Germanna Hwy, Culpeper, VA 22701
T. 540-399-5055
 - 2. Motherplants Ltd.
863 Hayts Road, Ithaca, NY 14850
T. 607-256-2482
 - 3. Sedum Master
746645 Township Rd. #4, Princeton, ON N0J 1V0
T. 1-888-458-4061
 - 4. Or approved equal.
- C. Minimum 85% vegetation coverage upon installation, minimum 90% coverage after the second full growing season.
- D. Vegetated mat shall be pre-cultivated for a period of at least 12 months prior to delivery with mixtures of proven green-roof plant species selected for climate compatibility within the geographic range of the project.

2.03 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".

2.04 SOIL AMENDMENTS

- A. Fertilizer: Provide "Healthy Start", manufactured by Plant Health Care Products, or the Commissioner approved equal.

4. Do not use large plants cut back to sizes specified
- C. Hardiness: Provide plant stock certified to have been grown within hardiness Zones 2-6 as established by the Arnold Arboretum, Jamaica Plain, Massachusetts. Plants without the certification will be rejected.
- D. 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. Shade and Flowering Trees: materials that meet or exceed the height and caliper specifications and measured according to ANSI Z60.1 for size and height.
 2. Deciduous Shrubs and Small Trees: materials with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type shape, and height of shrub.
 3. Groundcover and Vines: Provide groundcover and vines of species indicated, established and well-rooted in pots or similar containers, and complying with ANSI Z60.1.
 4. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.
 5. Bulbs: Bulbs shall be Top Size for species specified as defined by ANSI Z60.1, firm of flesh, free from decay and disease. Bulbs shall be certified as being grown for the season in which they will be installed.
- E. Trunk: The height of the large shrubs or small 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 have a single or multi-stem trunk growing from an 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.
- F. Rootballs: All plants to be moved balled & burlapped 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 rootballs damp and protected from damage due to sun and wind.
- G. Container Stock: Container stock shall have a full container of well-developed root system. Plants loose in the container are not acceptable. The surface of the root zone shall be free of circling or kinked roots. Staked plants must be self-supporting when unfastened from the stake. When removed from the container, the root ball shall be free from numerous circling roots. Plants with large matted roots at the sides or bottom of the container will not be accepted. Container-grown plants may be accepted for balled & burlapped material if approved by the Commissioner.
- H. Bare-root stock: Plugs shall have a well-developed root system. The surface of the root zone shall be free of circling or kinked roots. The root ball shall be free from numerous circling roots. Container-grown plants may be accepted for bare-root material if approved by the Commissioner.
- 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 leaves, buds, and root masses; plants

Contractor but the City of New York shall not be held responsible for the Contractor's defects in materials or workmanship that result in decline or death of plants.

1.11 GUARANTEE SERVICE

- A. Initial Guarantee Service: Provide guarantee service by skilled employees of landscape installer. Maintain as required in Part 3. Begin guarantee service immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than guarantee service period below.
 - 1. Guarantee Service Period for Trees and Shrubs: Two (2) years from date of planting completion.
 - 2. Guarantee Service Period for Ground Cover and Other Plants: Two (2) years from date of planting completion.

1.12 DESIGN AND PERFORMANCE REQUIREMENTS

- A. For botanical names of trees, shrubs and ground cover, refer to the names listed in "Hortus III: A Concise Dictionary of Plants Cultivated in the United States and Canada" published by MacMillan Publishing Co., New York, NY 10022.
- B. To determine caliper, size, height, width and root spread of plants, use the "American Standard for Nursery Stock" ANSI Z 60.1, published by the American Nursery & Landscape Association, 1250 "I" Street, NW, Suite 500, Washington, D.C. 20005.
- C. Pruning methods shall be in accordance with the 'Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance, - Standard Practices,' ANSI - A 300, as published by National Arborist Association, The Meeting Place Mall, Route 101, P.O. Box 1094, Amherst, NH 3031-1094.
- D. Base standards for weather conditions on reports on the weather radio band of the National Oceanic and Atmospheric Administration, Washington Science Center, Rockville, MD 20852, and on its publication entitled "Local Climatological Data With Comparative Data", published 12 times a year as a monthly and once a year as an annual.

PART 2 PRODUCTS

2.01 PLANT MATERIALS

- A. General: Furnish specimen, nursery-grown plants 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 scald, injuries, abrasions, and disfigurement. All parts of the plant shall be moist and show active green cambium when cut.
- B. 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: 3 1/2".
 - 2. Undersize stock: Not more than 10% of plants smaller than required may be used if 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.
 - 3. Plants furnished shall be an average of the minimum and maximum sizes shown on the Contract Drawings.

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.

1.09 ACCEPTANCE AND GUARANTEE SERVICE

- A. Request for Acceptance: In writing, request the 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 guarantee service) 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. Plant and Tree Service: Begin service immediately after planting. Provide complete service 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 service work. Throughout the service period, restore planting saucers and mulch, and keep plant beds weed-free. Tighten and adjust guy wires, stakes, and deadmen to keep trees in vertical position. Restore and replace damaged trunk wrappings.
 1. Service during contract: Completely serve plants and trees until final acceptance.
 2. Watering: Flood all plants during the construction and guarantee service periods at least twice each week. 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 for each watering.
 3. Applications of insecticides and herbicides are expressly prohibited. Confer with the Commissioner for methods of controlling insect infestation or disease.
 4. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and guarantee service periods. Treat, repair, or replace damaged plantings.

1.10 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 plants: Two (2) 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.
 3. Replacement Planting Seasons: Replacement for plant warranty work shall comply with the Planting Seasons specified herein.
 4. Owner's Responsibilities and Warranty Exclusions: After completion of the Contractor's maintenance responsibilities, the City of New York 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 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 City of New York'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 City of New York shall make reasonable efforts to correct the problems cited by the

1.08 DELIVERY, STORAGE AND HANDLING

- A. Store and handle unopened packaged materials bearing the trade name, manufacturer's name, weight and analysis; in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury, and theft.
- B. Store products away from moisture and extreme temperatures and in such a manner that they're effectiveness will not be impaired.
- C. Formulation, Application, and Equipment
 - 1. Use the manufacturer's recommended formula, application rate and safety instructions at all times.
 - 2. Mix and agitate products and use equipment according to the manufacturer's directions. Mix and agitate only in an area designated by the Commissioner.
 - 3. Dispose of spilled materials and surplus products offsite in a legal manner.
- D. 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 one material, plant, or group of plants. On-site storage is permissible only with written notice from the Construction Manager and the Commissioner.
 - 2. Deliver materials and plants only after preparations for planting have been completed and accepted, including but not limited to: subdrainage system, irrigation, rough grading, utilities, decompaction or remediation of soils. The Commissioner shall determine if the site is acceptable for planting.
- E. Transport plants in covered trucks only. Plants transported on open trucks from the nursery will be rejected by the Commissioner.
- F. Deliver soils only after site construction is complete.
 - 1. Prohibit vehicular and pedestrian traffic on or around stockpiled loam.
- G. Deliver bare root plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
- H. Do not prune shrubs before delivery, except as approved by Commissioner. Protect bark, branches, and root systems from sun-scale, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop plants during delivery.
- I. Handle planting stock by root-ball only. Do not lift, tip, drag, drop, or otherwise reposition plant materials by handling trunk, branches, twigs, or leaves.
- J. 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 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, mulch, wood chips, straw mulch, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. 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.
 - 4. 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.
- K. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- L. No plant shall be stored more than one week without written acceptance by the Commissioner.

- b. Mix and agitate products and use equipment according to the manufacturer's directions. Mix and agitate at the construction site only in a work area designated by the Commissioner.
- c. Dispose of spills and surplus products away from subject property in a legal & approved manner.
- d. Keep all records that are or may be required by Federal, State or Local laws. Submit copies of these records to the Commissioner within 5 days when so requested.
- e. Not less than forty-eight hours prior to a proposed spray operation, submit to the Commissioner for his approval, a tabulated list indicating the target to be treated, the chemical trade name and quantity of mix being prepared.
- f. All pesticide/herbicide applications shall be subject to inspections by the Commissioner. The Commissioner may at any time, suspend and reschedule a pesticide/herbicide application when, in his determination, the weather conditions are unfavorable, facility operations would be hampered or the Contractor's methods or materials fail to comply with these Specifications.

1.07 PROJECT CONDITIONS AND COORDINATION

- A. Utilities: Fully coordinate planting operations with utility installation and service line locations. **Determine and stake the location of underground utilities before project staking.**
- B. Concealed Conditions: Notify Commissioner before planting when conditions detrimental to proper plant growth are encountered. Do not proceed with planting without specific written instructions from the Commissioner.
- C. Sequence of Planting: Careful coordination shall be required to enable planting of trees and large woody materials simultaneously with the installation of planting soils. Install other plant materials after finish grades are established, unless otherwise approved by the Commissioner. Complete landscaping work as quickly as possible on portions of the site as they become available for planting.
- D. Planting Seasons: Work only within seasonal limitations for proper planting as follows, observing specific requirements as needed for individual species.

<u>Item</u>	<u>Spring Season</u>	<u>Fall Season</u>
Deciduous (container)	March 1 to May 1	Oct 1 to Nov 30
Deciduous (B&B)	March 1 to May 1	Oct 1 to Nov 30
Evergreens	March 30 to May 15	Sep 1 to Oct 15
Groundcover	April 15 to June 1	Sep 1 to Oct 30
Perennials	April 15 to June 1	Sep 1 to Oct 30
Bulbs		Oct 1 to Dec 1

- E. Weather Limitations: Plant only when ambient temperature is above 50°F [10°C], and when temperature has not been below 35°F [1°C]. Plant only when temperatures are forecasted to be within the aforementioned ranges for a period of 5 days after installation of material.
- F. Water: The Contractor shall bear the cost of supplying all water.
 - 1. Contractor shall install temporary water meter to measure water consumption. The Contractor shall immediately notify the Commissioner in writing if water is insufficient for work and maintenance operations.
 - 2. Provide as needed water from sources free from impurities injurious to vegetation.
 - 3. 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.
- 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.

- F. Inspection: Commissioner and the City of New York's representative will inspect all plant materials 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.
 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 characteristics of each plant including detailed photographs of the bark, the base of the tree (rootball 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 or 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 DDC General Conditions.
- H. Plant Sources: The Contractor shall submit to the Commissioner any questions regarding the source of any plant.
- I. General Requirements for Operations and Products:
1. All products listed in this specification shall be approved in writing by the Commissioner prior to delivery to the construction site.
 2. The Contractor shall obtain, retain, and make available for on-site inspection at all times, U.S. Department of Labor, Material Safety Data Sheets for all toxic substances and hazardous materials to be used in this Contract. One copy of said sheets shall be given to the Commissioner for review and approval prior to introduction of material to the construction site.
 3. After delivery to the construction site, the Commissioner, at his/her discretion, may take representative samples of any item listed in Part 2 - Products for analysis. Products which fail to comply with these specifications shall be immediately removed from the construction site and replaced with products which comply. No Work will be permitted until the non-complying product is removed from the construction site and replaced with one which complies with these Specifications.
 4. Asian Longhorned Beetle & Emerald Ash Borer: The Contractor shall be aware of the possibility of encountering the above pests. If observed or suspected of being present, the Contractor shall immediately notify the Commissioner and is requested to contact: N.Y.S. Department of Agriculture and Markets Division of Plant Industry, (347) 203-5503 or (800) 544-4501.
 5. Pesticide
 - a. Select to act on identified pest and use the manufacturer's recommended formula, application rate and safety instructions at all times;

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants in similar conditions.
1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.
 2. The entity performing pruning, planting and maintenance of this Section shall employ an experienced horticulturist who shall possess a minimum of the following:
 - a. Associate's Degree in Horticulture from a recognized college.
 - b. A minimum of three (3) years of work experience in this field.
 - c. Quality Assurance.
 - 1). Qualifications: The entity performing the Work of this Contract shall utilize the services of a horticulturist who shall act as superintendent for the installation and all maintenance of plantings for this Contract and shall be on site at all times including but not limited to: plant material deliveries, maintenance of plants at the site after delivery and prior to installation, verifying the trunk flare on all trees prior to planting, planting, tree stapling of trees, mulching, pest management, application of bio-stimulants to all plant materials, and notifying the Commissioner of any discrepancies or non-compliance to the Contract Specifications and Drawings.
- B. Plant Materials:
1. Provide quality, size, genus, species, and variety of exterior plants indicated. Provide only healthy, vigorous stock that is "Nursery Grown". "Nursery Grown" shall mean field-grown plants from a recognized nursery where the following horticultural practices have been aggressively performed.
 - a. IPM Program - Integrated Pest Management.
 - b. Cultivation - Including weed suppression.
 - c. Fertilization.
 - d. Pruning.
 - e. Irrigation
 2. Any plant material from a field where the above horticultural practices have not been consistently practiced in the last twelve (12) months shall be rejected. All Plants shall be free from disease, insects, eggs, larvae, and other defects. Provide plants in strict compliance with the recommendations of the following:
 - a. ANSI Z60.1, American Standard for Nursery Stock, latest edition.
 - b. American Association of Nurserymen, *Horticultural Standards*.
 - c. American Joint Committee on Horticultural Nomenclature, *Standardized Plant Names*, 1942 edition.
 - d. International Society of Arboriculture.
 - e. All plant materials shall be grown in nurseries located within the following states: Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin.
- 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. Shrub 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 or shrub for height and spread; do not measure branches or roots tip-to-tip.
- E. Pruning: Pruning of plants is prohibited except to remove dead or broken branches and limbs. Confer with the Commissioner and the City of New York's representative before any pruning. Plants pruned without permission from the Commissioner and the City of New York's representative are subject to rejection and replacement. A certified Arborist must be present during all tree work.

- I. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
 - J. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
 - K. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- 1.04 EXAMINATION OF CONDITIONS
- A. The Contractor shall verify all 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 execute 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 conditions 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.
- 1.05 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 Data for Landscape installer.
 - D. Samples and submittals for verification: Prior to ordering the below listed materials, submit representative samples to the Commissioner for selection and approval as follows. Do not order materials until the Commissioner's approval has been obtained. Delivered materials shall closely match the approved samples.
 - 1. Mulch: Two (2) 1pt. bags of mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
 - E. Delivery and Storage: Prior to construction the Contractor shall submit for the Commissioner's review and approval the proposed routing for deliveries and access to the site.
 - F. Compost Tea: Product data and breakdown of compost mixture.
 - G. Plant Source: The Contractor shall submit a list of nurseries for the Commissioner's review and approval a list indicating the plant botanical and common name, size, quantity, form, rootball dimensions, limb height (if applicable), and source for the plants. Plant list shall clearly indicate deviations from the specified plant list and any proposed substitutions for approval.
 - H. Plant Photographs: Provide photographs of plant materials to be purchased as indicated herein.
 - I. Planting Schedule: Indicate anticipated planting dates for plants.
 - J. Maintenance Instructions: Recommended procedures to be established by the City of New York for maintenance of plants during a calendar year.

SECTION 32 9300 – PLANT MATERIALS AND PLANTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum and [5] the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. The work of this Section includes all labor, materials, equipment and services necessary to complete the planting as shown on the drawings and/or specified herein, including but is not necessarily limited to the following:
1. Install Planting Soils;
 2. Provide and install Shrubs and Trees;
 3. Provide and install Groundcover, Perennial, and Herbaceous Plants;
 4. Provide and install Pre-grown Sedum Mat;
 5. Coordinate with other Trades;
 6. Protect and maintain the completed work;
 7. Warranty and Maintenance;
 8. Clean up.
- B. Extent of Landscaping Work: In addition to the work indicated, Landscape work includes restoring all areas within the Limit of Work disturbed by work of the Contract and coordination of work with other subcontractors.

1.03 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- H. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

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- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the Commissioner and replace with new planting soil.

3.02 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Maintenance and protection of existing trees within the project limits:
 - 1. No vehicles, mechanized equipment, material/equipment storage, and stockpiling, are permitted within the Critical Root Zone (CRZ) areas, unless otherwise directed by the Commissioner / Consulting Arborist.
 - 2. Demarcate CRZ area(s) with Plastic Safety Fence and Posts.
 - 3. CRZ, in this project, is defined as a horizontal distance from tree trunk measuring 12" min. per 1" of tree caliper measured at 4'-6" (DBH) encircling tree (i.e. A 12" DBH tree will have a CRZ circle of 24 feet diameter).
- C. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 GROWING MEDIA INSTALLATION

- A. Growing media shall be placed carefully to avoid damage or displacement of other materials such as walls, paving, drainage components, filter fabric, and roofing membrane.
- B. Growing media shall be placed to within 1 inch greater than final grade or to a depth of no greater than 8 inches and compacted as described below. For final grades less than 8 inches only one round of compaction shall be performed and remaining growing media loosely placed such that top of growing media exceeds final grade by 1 inch. For final grades greater than 8 inches, place growing media at no greater than 6 inches and repeat procedure until growing media has been compacted within 1 inch of final grade.
- C. Compaction shall be performed with a 300 - 400 lb. landscape roller. Mechanical compactors including plate compactors are not recommended.
- D. After compaction remaining growing media shall be placed at 1 inch greater than final grade and thoroughly watered or jetted over entire area. Low settled areas shall be filled with additional growing media and re-wet to achieve uniform prescribed final grade.

3.04 CLEANUP AND PROTECTION

- A. During soil installation, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect soils from damage due to landscape operations and operations of other subcontractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.05 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off the City of New York's property.

END OF SECTION

- b. Percent organic content;
- c. Soil acidity.
- 6. Recommendation shall include type of soil additive and fertilizer, their composition and rate, and means of application.
- 7. Note that any and all materials and procedures with respect to soil additive and fertilizers, contained herein, are the responsibility of the subcontractor and are approximate, and that all soil additives will be adjusted to comply with test reports.

2.05 MULCHES

- A. Mulch shall be shredded bark mulch non-colored double hammer-milled hardwoods, cedar, hemlock hardwood blend as supplied by Long Island Compost or approved equal.

2.06 MISCELLANEOUS PRODUCTS

- A. Burlap: Non-synthetic, biodegradable.
- B. Drainage Gravel: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
- C. Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

2.07 EXTENSIVE GREEN ROOF GROWING MEDIA

- A. Custom growing media mix capable of supporting vigorous growth of the specified vegetation, complying with the following specification.
 - 1. American Hydrotech, Inc
303 East Ohio Street, Chicago, IL 60611-3318
T. 800-877-6125
 - 2. Soprema Roofing & Waterproof
310 Quadral Dr, Wadsworth, OH 44281
T. 800-356-3521
 - 3. ZinCo USA, Inc.
471 Page Street Unit 5, Stoughton, MA 02072
T. 866-766-3155
- B. Basis of Design: LiteTop Growing Media by American Hydrotech, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.03 TOPSOILS

- A. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 6 inches deep; do not obtain from agricultural land, bogs, or marshes.
1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones $\frac{1}{2}$ inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
 2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Ratio of Loose Compost to Topsoil by Volume: 1:3.
 - b. Ratio of Loose Sphagnum and/or Muck Peat to Topsoil by Volume: 1:3.
 - c. Volume of Sand Plus 10 Percent Diatomaceous Earth 1000 Sq. Ft.
 - d. Weight of Commercial Fertilizer per 1000 Sq. Ft. as recommended by soil test.
 - e. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. as recommended by soil test.

2.04 SUBSOIL

- A. Stockpiled subsoil from stripping of site may be used if meeting requirements specified. Furnish additional subsoil required for planting and lawns from sources off the site if stockpiled topsoil is insufficient, or stockpiling is not performed.
- B. Subsoil material shall consist of unweathered subsoil (B horizon) and shall be free of hard fragments and stones larger than two inches across the greatest dimension, objectionable salts, noxious weeds and plants, partially disintegrated debris, or any other material inferior to the surface soils. All soils to be obtained from naturally drained sources and shall contain at least three percent natural organic matter (as determined by loss on ignition of moisture) - three samples dried and tested in accordance with current methods of the Association of Official Agricultural Chemists.
- C. Subsoil shall be amended as needed to meet the following requirements:
1. A minimum of 3%, and not to exceed 6% of combined organic matter.
 2. Soil acidity range: pH 5.7 to pH 7.7 inclusive.
 3. Soil fertility shall rate "medium" in natural nutrients based on the coordinated ratings in pounds per acre as established by the National Soil and Fertilizer Research Committee.
 4. All subsoil obtained from on-site or borrow obtained from off-site used for work of this section shall be tested prior to being spread or mixed. All testing shall be done by approved independent test laboratory. Subcontractor shall provide required representative samples of material proposed for use to testing facility for analysis and recommended treatment. The Subcontractor shall bear any and all costs incurred in testing and analysis. Test reports also contain specific recommendations as to the exact types, times, and rates of application of soil additives and fertilizers based upon the soil test results and type of material to be planted. Approved materials and subsoil shall be covered with waterproofing membrane if stored on site. Approved material shall be stockpiled as not to be contaminated or to interfere with other work or with other subgrade or fill materials. Recommendations shall be followed during planting operations.
 5. Analysis shall include:
 - a. Classification of soil;

Beneficial Bacteria:

Nitrogen-Fixing Bacteria Spores	2 million
Phosphorous-Solubilizing Bacteria Spores	2 million
Growth-Promoting Bacteria Spores	2 million

Per 21 Gram Tablet:

- B. Bio-stimulants: Bio-stimulants shall be 'Mycor-Tree Saver Transplant' as manufactured by Plant Health Care, Inc., Pittsburgh, PA 15238, (800)-421-9051 or an approved equal conforming to the following:

1. Fertilizer/Bio-Stimulant (Shrubs, Perennials, & Groundcovers): Shall be a granular, organic fertilizer and soil conditioner with beneficial mycorrhizal fungi and nitrogen-fixing/phosphorus solubilizing bacteria. Fertilizer/Bio-Stimulant shall be 'Mycor 4-7-4 + Micros Plant Saver', as manufactured by Plant Health Care, Inc., Pittsburgh, PA 15238, (800)-421-9051 or an approved equal conforming to the following.

Beneficial Mycorrhizal Fungi Bacteria:

Live Spores of VA Endomycorrhizal Fungi

Analysis (per 4 ounces)

Minimum of 300 Spores of Vesicular-Arbuscular (VA) Fungi.
Includes: Entrophospora columbiana, Glomus etunicatum, Glomus clarum and Glomus sp.

Live Spores of an Ectomycorrhizal Fungus

Minimum of 10 million spores of Pisolithus tinctorius.

Nitrogen-Fixing Bacteria

Approx. 50 million per pound

Phosphorus-Solubilizing Bacteria

Approx. 50 million per pound

Growth Promoting Bacteria

Approx. 50 million per pound

Soil Conditioner Ingredients:

Humic Acid (Minimum 15% by Weight)
Complex Carbohydrates and Dried Yeast
Amino Acids
Yucca Plant Extract (Wetting Agent)
Sea Kelp Extract (Biostimulant)

Derived From:

Natural Humates
Processed Grain Byproducts
Animal and Plant Proteins
Yucca schidigera
Ascomyces nodosum

Guaranteed Nutrient Analysis 4-7-4:

Nutrient:

Nitrogen (N)
Phosphate (P2O5)
Potassium (K2O)
Calcium (Ca)
Sulfur (S)
Magnesium (Mg)
Iron (Fe)
Manganese (Mn)
Zinc (Zn)

% Analysis By Weight:

4.0%
7.0%
4.0%
6.0%
2.4%
3.0%
3.0%
0.7%
0.4%

- B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.02 FERTILIZERS / BIO-STIMULANTS (TREES)

- A. Fertilizer: Fertilizer shall be 'Healthy Start 12-8-8 Macro Tabs', 21 gram tablets, as manufactured by Plant Health Care, Inc., Pittsburgh, PA 15238, (800)-421-9051 or an approved equal conforming to the following:

<u>Essential Element Ingredient:</u>	<u>% Analysis by Weight:*</u>
Nitrogen	12.0% (8% controlled release)
Phosphorus	8.0%
Potassium	8.0%
Calcium	2.0%
Sulfur	1.0%
Magnesium	0.2%
Iron	0.2%

* Organic forms derived from Ureaform (Nitroform), Methlene Ureas (Nutralene), Ammoniated Phosphates, Bone Meal, Blood Meal, Kelp Meal, Feather Meal, Sulphate of Potash, Longbeinite, Humates, Whey Protein and Rice Bran

<u>Ingredient:</u>	<u>Analysis (per 3 ounce packet):</u>
Live Spores of VA Endomycorrhizal Fungi	Minimum of 1000 Spores of Vesicular-Arbuscular (VA) Fungi. Includes: Entrophospora columbiana, Glomus etunicatum, Glomus clarum and Glomus sp.)
Live Spores of an Ectomycorrhizal Fungus	Minimum of 60 million spores of Pisolithus tinctorius
Terra-Sorb HB Water Absorbent Gel	Acrylamide copolymer gel
Dry Soluble Yucca Plant Extract	Yucca schidigera
Soluble Sea Kelp Extract	Ascophylum nodosum
Humic Acids	Leonardites Humates

<u>Soil Conditioner Ingredients:</u>	<u>Derived From:</u>
Humic Acid (Minimum 12% by weight)	Natural Humates
Natural Sugars, Dried Yeast & Other Carbohydrates	Processed Grain By Products
Amino Acids	Animal and Plant Proteins
Yucca Plant Extract (Wetting Agent)	Yucca schidigera
Sea Kelp (Biostimulant)	Ascophylum nodosum

2. Mix and agitate products and use equipment according to the manufacturer's directions. Mix and agitate only in an area designated by the Commissioner.
3. Dispose of spilled materials and surplus products offsite in a legal manner.

1.07 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Fertilizers shall conform to current standards as established by the Association of American Plant Food Control Officials, Inc., Division of Regulatory Services, University of Kentucky, Lexington, KY 40546.
- B. Mulch shall conform to current standards established by National Bark Producers Association, 13542 Union Village Circle, Clifton, VA 22024.

PART 2 PRODUCTS

2.01 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter of a generally humus nature; free of substances toxic to plantings and objectionable odors. Compost shall meet EPA Exceptional Quality Standards and all State & Local Environmental Agency requirements. In addition compost shall conform to the following:

Parameters	Range
pH	5.7 - 7.7
Moisture Content	35% - 60%
C:N Ratio	15-30:1
Organic Matter	> 30%
Soluble Salts	< 10 mmhos/cm (ds/m)
Nitrogen	> 1.5%
Phosphorus	> 0.5%
Potassium	> 0.1%
Particle Size	100% Passing 1/2" screen
Stability - Carbon Dioxide Evolution Rate	< 8 mg CO ₂ -C per g OM per day
Maturity (Bioassay)	
Seed Emergence	80% Min.
Seedling Vigor	80% Min.
Physical Contaminants (Inerts)	< 0.5% dry weight basis
Chemical Contaminants	Meet or exceed US EPA Class A standard, 40 CFR § 503.13, Tables 1 & 3 Levels
Biological Contaminants	
Fecal Coliform Bacteria	Meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) levels
Salmonella	

- E. Subsoil: Before delivery of subsoil, furnish the Commissioner with written statement giving location of properties from which subsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during the past two years. If the soil is manufactured, provide source location. SUBSOIL ACQUISITION AND AMENDMENTS TO SUBSOIL ARE THE RESPONSIBILITY OF THE SUBCONTRACTOR.
- F. Preinstallation Conference: Conduct conference at Project site.
- G. After delivery to the construction site, the Commissioner, at his/her discretion, may take representative samples of any item listed in this specification for analysis. Products which fail to comply with these specifications shall be immediately removed from the construction site and replaced with products which comply. No Work will be permitted until the non-complying product is removed from the construction site and replaced with one which complies with these Specifications.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- C. Project Conditions:
 - 1. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
 - 2. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by the City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
 - a. Notify Construction Manager and the Commissioner no fewer than two days in advance of proposed interruption of each service or utility.
 - b. Do not proceed with interruption of services or utilities without Construction Manager's and the Commissioner's written permission.
- D. Weather Limitations:
 - 1. Perform soil installation operations only during the following:
 - a. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
 - b. There shall be no frost in the ground and the soil and backfill materials temperature at each planting area shall be above 32 degrees F.
 - c. Perform soil related operations only when no form of precipitation is falling or forecast to fall within the next 2 hours. Following a period of precipitation, resume operations only after the soil has drained.
- E. Store products away from moisture and extreme temperatures and in such a manner that their effectiveness will not be impaired.
- F. Formulation, Application, and Equipment
 - 1. Use the manufacturer's recommended formula, application rate and safety instructions at all times.

1. Planting Soil: 1-pound volume of each soil required; in sealed plastic bags labeled with composition of materials by percentage of weight. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
 2. Organic Compost: 1-pound volume of each organic compost required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
- C. Qualification Data: For qualified subcontractor. Include list of similar projects completed by subcontractor demonstrating subcontractor's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
- E. Material Test Reports: For standardized ASTM D 5268 topsoil and imported or manufactured topsoil.
- F. Maintenance Instructions: Recommended procedures to be established by the City of New York for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

1.05 QUALITY ASSURANCE

- A. Subcontractor Qualifications: A qualified subcontractor whose work has resulted in successful establishment of plants.
1. Experience: Three (3) years' experience in landscape installation.
 2. Subcontractor's Field Supervision: Require subcontractor to maintain an experienced full-time supervisor on Project site when work is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: For each soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from the Commissioner. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 3. Report suitability of tested soil for plant growth.
 - a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Topsoil: Before delivery of topsoil, furnish the Commissioner with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during the past two years. If the soil is manufactured, provide source location.
TOPSOIL ACQUISITION AND AMENDMENTS TO TOPSOIL ARE THE RESPONSIBILITY OF THE SUBCONTRACTOR.

SECTION 32 9113 - PLANTING SOILS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. Section Includes:
 - 1. Planting soils.
 - 2. Amendments.
 - 3. Fertilizers.
 - 4. Mulches.
 - 5. Miscellaneous products.
 - 6. Extensive green roof growing media
- B. Related Sections:
 - 1. Section 329300 "Plant Materials and Planting".

1.03 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil.
- F. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- H. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated in, but not limited to, this specification.
- B. Samples for Verification: For each of the following:

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Any metallic pigmented coating compliant with Part 205 of Title Six of the New York Codes, Rules and Regulations meets the standard required under this specification. The maximum content of VOCs shall be determined according to the test method required under part 205.6 of such part.

2.07 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.
 - 1. Provide Stainless-steel fasteners with plastic or rubber separation washer for fastening powder coated steel.
 - 2. Provide galvanized-steel fasteners with plastic or rubber separation washer in addition to galvanized-steel washer for fastening galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. No Field Welding.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

3.02 PACKING, LOADING AND STORAGE

- A. Packing and Loading: Store and handle products in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage and theft.

3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

3.04 REPAIR, POINTING, CLEANING, AND PROTECTION

- A. Damage to products during installation will require replacement of unit.

END OF SECTION

2.05 STEEL FRAMING

- A. Steel Framing: Framing members made from steel tubing, bars and shapes. Includes framing for Metal Planter with Bench:
 - 1. Fabricators: Subject to compliance with requirements, provide products by one of the following:
 - a. Kammetal,
29 Imlay Street, Brooklyn, NY 11231
T. 718-722-7400
 - b. Precision Metal Fabrication
236 39th Street, Brooklyn, NY 11232
T. 718-832-9805
 - c. Custom Fabrication Incorporated
2903 NY Route 7, Harpursville, NY 13787
T. 800-922-0070
 - d. Or approved equal.
- B. Galvanized Steel
 - 1. Hot-dip galvanizing shall be applied in accordance with:
 - a. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products;
 - b. ASTM A153: Galvanized Coating on Iron and Steel Hardware - Table 1;
 - c. ASTM A924: Galvanized Coating on Steel Sheet;
 - d. Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.

2.06 METAL PLANTER / BENCH FASCIA PANEL

- A. Steel Panels: Panels made from Steel Plates, Shapes, and Bars.
 - 1. Fabricators: Subject to compliance with requirements, provide products by one of the following:
 - a. Kammetal,
29 Imlay Street, Brooklyn, NY 11231
T. 718-722-7400
 - b. Precision Metal Fabrication
236 39th Street, Brooklyn, NY 11232
T. 718-832-9805
 - c. Custom Fabrication Incorporated
2903 NY Route 7, Harpursville, NY 13787
T. 800-922-0070
 - d. Or approved equal.
- B. Galvanized Steel
 - 1. Hot-dip galvanizing shall be applied in accordance with:
 - a. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products;
 - b. ASTM A153: Galvanized Coating on Iron and Steel Hardware - Table 1;
 - c. ASTM A924: Galvanized Coating on Steel Sheet;
 - d. Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.
- C. Finish for Steel Items: Powder Coating
 - 1. Powder Coat Steel Finishes to be TIGER Drylac Series 38 coating, as provided by Tiger Drylac (St. Charles, IL 60174. PH: 1.800.243.8148), or approved equal.
 - 2. Thickness: 6 mil THK.
 - 3. Color: Super Durable - 038/53000 "Yuma Green"
 - 4. New York City EPP Minimum Standards for Metallic Pigmented Coating: Maximum Concentration of Volatile Organic Compounds in Grams per Liter: 500

- B. Stainless-Steel Plate, Bars, and Shapes: ASTM A 276, Type 304.

2.03 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value and finish of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.04 FINISHES, GENERAL

- A. Powder Coat Steel Finishes to be TIGER Drylac Series 38 coating, as provided by Tiger Drylac (St. Charles, IL 60174. PH: 1.800.243.8148), or approved equal.
1. Thickness: 6 mil THK.
 2. New York City EPP Minimum Standards for Metallic Pigmented Coating: Maximum Concentration of Volatile Organic Compounds in Grams per Liter: 500
Any metallic pigmented coating compliant with Part 205 of Title Six of the New York Codes, Rules and Regulations meets the standard required under this specification. The maximum content of VOCs shall be determined according to the test method required under part 205.6 of such part.
- B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- C. Finish metal fabrications after welding, drilling, and prior to assembly.
- D. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

- F. Engineering Calculations: Submit engineering calculations described herein, concurrently with the corresponding shop drawings. All calculations shall bear the seal of a Professional Engineer registered in the State of New York.
- G. Submit maintenance manual:
 - 1. At the completion of the project, submit a maintenance manual describing the various materials, equipment and procedures for cleaning and maintaining the work of this Section.

1.05 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Materials and methods of construction shall comply with the following standards:
 - 1. ANSI: American National Standards Institute.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. FS: Federal Specifications.
 - 4. New York City Environmentally Preferable Purchasing (EPP) Minimum Standards for Construction Products.

1.06 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
- B. All Shop Drawings shall accurately reflect field conditions.

1.07 MANUFACTURER / FABRICATOR WARRANTY

- A. Unless stated otherwise in these specifications, warranty shall state that all work is in accord with drawings and specifications, as amended by any changes thereto authorized by the Commissioner, free from defects in materials and workmanship and weather tight for a period of five (5) years from the date of acceptance of the work by the Commissioner. All work shall remain free of structural failure for a continuous period of five (5) years. Manufacturer / Fabricator shall agree to repair or replace defective materials and workmanship to "like new condition", including such exploratory work, as necessary to determine the cause, during the warranty period, at no change to Contract Amount.
- B. The warranty, the enforcement or lack of enforcement thereof, shall not deprive the City of New York of other actions, rights, or remedies available to it. Warranty shall be in form approved by the Commissioner. Warranty does not cover damage resulting from vandalism or acts of nature exceeding performance criteria.

PART 2 PRODUCTS

2.01 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.02 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

LANDSCAPE
METAL FABRICATIONS
32 3300 - 2

SECTION 32 3300 - LANDSCAPE METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENT

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.02 SUMMARY

- A. Section includes:
 - 1. Steel Framing for the installation of Metal Planter with Bench
 - 2. Metal Planter / Bench Fascia.

1.03 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Metal Planter / Bench Fascia Powder Coat
- B. Samples: Prior to ordering the below listed materials, submit representative samples to the 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. Submit duplicate samples of each type listed below showing full range of color variation, finish and texture that can be expected in the permanent work:
 - 1. Samples: Two 12"x12" Powder Coat Steel panel showing color and finish of Metal Planter / Bench Fascia.
- C. Shop Drawings: Show fabrication and installation details. All dimensions to be verified in field and incorporated into shop drawings prior to submittal. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel Framing for installation of Metal Planter with Bench
 - 2. Metal Planter / Bench Fascia.
- D. 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.
- E. 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.

3.05 PROTECTION, CLEANING AND ACCEPTANCE

- A. Protect the work of this section from any material, equipment or practices that may impair the functioning, appearance and/or durability of the work of this section and any other construction.
- B. Package and store materials in a manner that will prevent damage, contamination, distortion, breakage or structural weakening. Pre-glazed units shall be stored upright or crates shall be covered with a rigid protection board to prevent damage.
- C. Replace any material damaged during manufacture, shipping, storage or erection.
- D. Protection materials shall be installed in a manner that will not trap harmful moisture or otherwise contaminate the Work in any way. Do not leave plastic protection sheeting on metalwork after installation.
- E. Submit samples and manufacturer's performance data, as well as application and removal procedures for all protection.
- F. Remove and replace any portion of the work of this section that has been damaged by other trades. All damaged material as well as all debris caused by or incidental to the installation shall be promptly removed from the site.
- G. Acceptance of the completed installation requires that the installation be sound, watertight where required, and free from defects of materials and workmanship.
- H. Immediately prior to completion of the Work, completely clean the entirety of the work of this section.
 - 1. Clean all components of the Work as per the recommendations of the specific product manufacturer. Only non-toxic cleaning compounds are to be used. Questionable products must be submitted to the Commissioner for approval before use.
 - 2. Clean from the top most levels down in order to avoid staining of cleaned surfaces from cleaning solution residue and run-off.

END OF SECTION

2. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide embed layouts, setting diagrams, templates, instructions and directions as required for installation.
 3. Anchors and connections shall be provided to fully satisfy their required purpose of adjustability, movement and load transfer.
 4. Anchors and connections that do not provide for movement shall prevent such movement by appropriate means.
 5. Anchors and connections that are designed for movement shall be of such construction that friction is low enough to allow for such movement without causing buckling and any other damage and without causing binding and noises.
 6. Metal surfaces shall be separated in such a manner that metal does not move on metal. Materials used for this purpose shall be low-friction components, sealants or gaskets as applicable.
 7. Connections between different materials, or different alloys of the same metal, shall be designed to accommodate the differential thermal movement of the materials to be connected.
 8. Avoid excess shimming that may induce additional stress on the fastener. The total thickness (t) of a shim pack shall not exceed a dimension equal to the diameter (d) of the fastener/anchor. Where $t > d$, the fastener/anchor shall be recalculated to take into account the additional stress from bending on the fastener with the assumption that the shim does not contribute to resistance to fastener bending. Additional stress due to bending shall be added to tension stress and the tension/shear interaction analyzed.
- I. Corrosion Protection.
1. Ensure by design that no metals, including alloys of the same base metal, are placed together in a manner, combination, or location likely to give rise to damage by electrolytic action or other corrosion. In particular, avoid metal to metal contact between aluminum and metals other than an appropriate alloy of stainless steel as per the recommendations of the material manufacturer and to the approval of the Commissioner. Ensure that dissimilar aluminum alloys in contact with each other are compatible with each other or are isolated. Any other dissimilar materials are to be treated or protected in such a manner as necessary to prevent corrosive action.
 2. Isolation of dissimilar metal surfaces to prevent electrolytic action shall be accomplished by materials which are impervious to moisture and non-absorptive.
 3. All steel parts shall receive a protective treatment commensurate with their respective functions and locations. The treatment shall be one or more of those described in Section 2.03 and as approved by the Commissioner.
 4. Field welds on galvanized steel shall be treated with an approved cold galvanizing process (i.e. ZRC). Cold-galvanizing compounds are subject to approval by the Commissioner. All repair procedures shall comply with the recommendations of ASTM A 780.
 5. Aluminum surfaces in contact with mortar, concrete, fireproofing, plaster, masonry, or absorptive materials of any kind shall be coated with an anti-galvanic material, impervious to moisture.
- J. Use of Sealing Materials: Sealing materials specified in this Section shall be used in strict accordance with manufacturer's printed instructions and shall be applied only by mechanics specially trained or experienced in their use. Before applying sealing materials, all mortar, dirt, dust, moisture and other foreign matter shall be completely removed from surfaces it will contact. Adjoining surfaces shall be masked, when required, to maintain a clean and neat appearance. Sealing compounds shall be tooled to fill the joint and provide a smooth finish surface.
- K. Prior to and during the installation, the Contractor shall make sure no galvanized coating damage has occurred, parts with damaged coating will not be accepted by the Commissioner.
- L. Any fences and gates not set plumb and true to line and grade shall be removed and replaced at the Contractor's expense. The Contractor shall maintain the fences and gates during the life of the contract and shall repair replace all members that are disturbed, damaged, or destroyed.

5. Weld splatter and welding oxides on exposed surfaces shall be removed. All exposed welds shall be finished to match and blend with adjacent parent metal prior to final finish application.
6. Stud welding shall be done by mechanics trained by the manufacturer of the stud setting system. The manufacturer shall develop specific programs and instructions in cooperation with the fabricator to suit the needs of the specific details. The fabricator shall exercise particular care that all recommendations of the manufacturer are closely followed.
7. Visible marks such as telegraphing on finished surfaces due to welding of studs shall not be acceptable.
8. For prefabricated fence panels and associated assemblies, all welding and fabrications shall be done prior the application of hot-dip galvanization.

3.04 INSTALLATION

- A. Qualifications of Workers.
 1. All work shall be performed by skilled workers, especially trained and experienced in this type of work.
- B. Lines and Grades: Benchmarks for elevations and all metal fabrication offset marks for alignment shall be established on each floor level by the contractor, who shall be responsible for their accuracy. Should any error be found in their location, the installation Contractor shall so notify the Contractor in writing and installation work shall not proceed in the affected areas until the errors have been corrected.
- C. Prior Inspection of the Structure: After lines and grades have been established, and before beginning installation in any area, the Installation Contractor shall examine all parts of the structure on which the work is to be placed in that area. Should any conditions be found which, in his opinion, will prevent the proper execution of the work, he shall report such conditions in writing to the Contractor. Installation work shall not proceed in that area until such conditions are corrected or adjusted by the Contractor to the satisfaction of the Installation Contractor.
- D. Workmanship: All parts of the work shall be erected, plumb and true, in proper alignment and relation to established lines and grades, and as show on approved shop and/or erection drawings.
- E. Erection Tolerances: Permissible dimensional tolerance in the building frame and/or work surrounding or supporting the work of this Section are as noted in sub-paragraph "Performance Requirements" specified herein.
 1. The work shall be designed and installed to accommodate all tolerances and anticipated dead and live load movement, creep, sway and torsion of the structure without any harmful effects. All parts of the work, when completed, shall be within the following tolerances and shall remain so during the life of the structure:
 - a. Max. variation from plane or location shown on approved shop drawings: 1/8" per sq. ft. of length or 1/2" in any total length.
 - b. Max. offset from true alignment between 2 members abutting end-to-end or edge-to-edge in line: 1/32".
 2. All tolerances are non-cumulative.
- F. Welding of Steel Framing: All welding shall be done by skilled mechanics, certified, qualified or licensed in accord with local building regulations and shall conform to the recommended practices of the American Welding Society. Welds and adjoining burned areas shall be thoroughly cleaned and painted with 2 coats of material specified herein for shop priming. Special care shall be taken to protect glass and other finished surfaces from damage and to prevent causing fires.
- G. Care shall be exercised to properly brace and reinforce prefabricated assemblies against racking during hoisting and installation.
- H. Anchors and Connections.
 1. Bolt holes shall be drilled prior the application of hot-dip galvanization.

- J. 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.
- K. Exposed Work: In addition to requirements specified herein or 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. Ornamental metal work exposed to view shall be straight and true to line or curve, smooth arises 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. 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.
- L. Materials shall be of such strength, thickness and alloy that they are capable of meeting all standards and descriptions specified herein and as detailed on drawings.

3.03 FABRICATION AND ASSEMBLY

- A. The design of the Work of this Section shall endeavor to keep site operations to a minimum. Manufacturing, finishing and assembly processes shall, to the extent practicable, be carried-out off-site and under controlled environmental conditions.
- B. Assembly procedures to be carried out on-site shall be simple to execute and capable of execution within the time(s) allowed in the overall Project Construction Schedule.
- C. Manufacturer's Standards: Materials, components, and systems incorporated in the Work shall be mixed, applied, installed and otherwise used in strict accordance with the recommended standards and procedures of the respective manufacturers.
- D. Storage and Handling: Materials shall be stored in a dry, well-ventilated location. Handling of materials shall be kept to a minimum, and all materials shall be carefully protected from soiling and from condensation or other harmful moisture.
- E. Jointing and Reinforcing
 - 1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contacts.
 - 2. All work shall be properly reinforced for hardware, anchors and other attachments.
 - 3. Exposed Fasteners
 - a. Exposed fasteners shall occur only where expressly permitted by the Commissioner.
 - b. Spacing and location of all fasteners shall be as approved by the Commissioner.
 - c. Where exposed in finished surfaces, fasteners shall be socket-head countersunk type screws, spanner head bolts, or socket head cap screws, as indicated on the Drawings and to the approval of the Commissioner.
- F. Welding
 - 1. All welding of steel shall be in accordance with the recommendations of the American Welding Society.
 - 2. Steel welding shall be done by skilled mechanics qualified by test as prescribed in the American Welding Society code and as applicable to the material thickness and type of welded joint on which the welders will be employed.
 - 3. All welding shall be done with electrodes and/or methods recommended by the suppliers of the metals being welded. The type, size, and spacing of welds shall be as shown on the approved shop drawings. Welding materials and methods shall be such as not to cause distortion, discoloration, or result in any adverse effect on the required profiles and finishes of visible surfaces of the work of this section.
 - 4. Welding of stainless steel shall be by TIG welding or other methods subject to approval. Use double bevel butt welds, backing bars to remove heat, jiggling, tack welds and any other measures necessary to minimize distortion.

- E. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workers. All work shall be accomplished to the satisfaction of the Commissioner and the City of New York.
- F. To the fullest extent possible, fabrication and assembly shall be executed in the shop. Work not shop-assembled shall be shop-fitted.
- G. All components exposed in the finished work shall be free from warping; oil-canning effects; the telegraphing of welds, studs, and other fasteners; streaks; and tool or die marks.

3.02 FABRICATION

- A. Tolerances: Verify dimensions on site prior to shop fabrication.
- B. Shop fabricate to designs indicated on Drawings and to meet performance requirements specified.
- C. Shop fabricate fittings, interfacing parts and assemblies so that field cutting adjustments are not necessary.
- D. Make exposed joints butt, flush, and hairline.
- E. 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, square and free of burrs, without deforming adjacent surfaces or metals.
- F. Holes: Drill or cleanly punch holes (do not burn), so that holes will be accurate, clean, neat and sharp without deforming adjacent surfaces or metal. Drill or cleanly punch holes prior to galvanizing and powder coating.
- G. Connections
 - 1. Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to water. Locate joints where indicated on drawings. Provide connections to allow for thermal movement of metal at locations and by methods approved by the Commissioner. For work exposed to view, use concealed fasteners (unless welded or other connections indicated) with joints accurately fitted, flush and rigidly secured with hairline contacts.
 - 2. Welding: Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. 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 so that joint will not be visible; undercut metal edges where welds are required to be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surfaces will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. Remove weld spatter and welding oxides from all welded surfaces. There will be no field welding.
 - 3. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads, where shown to be exposed to view, shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts and peen of adjacent metal.
- H. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items for architectural metal work 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.
- I. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.

2. Provide colors or color matches as indicated on selected samples.
 3. Protect mechanical finishes on exposed surfaces from damage by application of strippable temporary protective covering prior to shipment.
 4. Corrosion Protection: Coat concealed surfaces which will be in contact with concrete, masonry, wood or dissimilar metals, in exterior work and work to be built into exterior and below grade walls and decks, with a heavy coat of bituminous paint. Do not extend coating onto exposed surfaces.
 - a. New York City EPP minimum standards for rust preventative/anti-corrosive paint:
Maximum Concentration of Volatile Organic Compounds in Grams per Liter: 250.
The maximum content of VOCs shall be determined according to the American Society for Testing and Materials test method D 5116 (Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products).
- B. Stainless Steel
1. Bright, vertical directional polish: AISI No. 4 finish.
- C. Galvanized Steel
1. High-Performance Coating: Apply epoxy primer and aliphatic acrylic polyurethane topcoat to prepared surfaces. Apply at spreading rates recommended by coating manufacturer.
 - a. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.
- D. Scratches and minor blemishes occurring on exposed surfaces of the metal work fabrication, including marks due to rolling, forming, drawing, welding or tooling shall be removed by grinding and polishing. Only clean polishing wheels and grinding and polishing compounds shall be used.

2.09 PROTECTION

- A. It shall be the responsibility of the Contractor to provide necessary protection to all exposed surfaces of architectural metal work, so as to prevent damage, staining, discoloration, abrasion, etc., to these surfaces from time of shipment from factory to acceptance of work of this project. Protection shall be provided by wrappings, strippable coatings, or other means. After installation, remove protective paper or strippable coating and clean exposed surfaces, and then provide additional temporary protection to protect architectural metal work from damage during subsequent construction activities. Surfaces which are damaged, stained, discolored, abraded, etc., shall be rejected and replaced with new by the Contractor, at no change to Contract Amount.

PART 3 EXECUTION

3.01 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.
- B. Use no materials, equipment or practices that may adversely affect the functioning, appearance or durability of the completed work and related construction.
- C. The work of this section shall be accomplished in compliance with the specified criteria without buckling; opening of joints; undue stress on fasteners; leakage; noises or other harmful effects.
- D. Conform strictly to the materials, finishes, shapes, profiles, sizes, thicknesses, and joint locations required by the Contract Documents.

- F. 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, square and free of burrs, without deforming adjacent surfaces or metals.
- G. Holes: Drill or cleanly punch holes (do not burn), so that holes will be accurate, clean, neat and sharp without deforming adjacent surfaces or metal.
- H. Connections
 - 1. Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to water. Locate joints where indicated on drawings. Provide connections to allow for thermal movement of metal at locations and by methods approved by the Commissioner. For work exposed to view, use concealed fasteners (unless welded or other connections indicated) with joints accurately fitted, flush and rigidly secured with hairline contacts.
 - 2. Welding: Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. 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 so that joint will not be visible; undercut metal edges where welds are required to be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surfaces will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. Remove weld spatter and welding oxides from all welded surfaces.
 - 3. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads, where shown to be exposed to view, shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts of adjacent metal.
- I. Operating Mechanism: Operating devices, 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.
- J. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items for architectural metal work 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.
- K. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- L. 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.
- M. Exposed Work: In addition to requirements specified herein or 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. Ornamental metal work exposed to view shall be straight and true to line or curve, smooth arises 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. 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.
- N. Materials shall be of such strength, thickness and alloy that they are capable of meeting all standards and descriptions specified herein and as detailed on drawings.

2.08 SHOP FINISHING

- A. General
 - 1. Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated.

- b. ASTM A153: Galvanized Coating on Iron and Steel Hardware - Table 1;
- c. ASTM A924: Galvanized Coating on Steel Sheets;
- d. Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.

2.04 COATING MATERIALS

- A. Clear hydrophobic acrylic resin protective coating for galvanized steel.

2.05 MISCELLANEOUS MATERIALS

- A. All hardware to be galvanized steel, unless otherwise indicated.
- B. Concrete: Normal-weight concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size.
- C. Nonshrink Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 and specifically recommended by manufacturer for exterior applications.
- D. Provide straps, plates and brackets, built-in inserts, as required for support and anchorage of the fabricated items to adjacent surfaces.
- E. Brackets, Shims and Reinforcements.
 - 1. Provide aluminum and/or steel brackets, clips, shims and reinforcements as required and as approved by the Commissioner.
 - 2. Where steel reinforcement of units is required for strength and as approved by the Commissioner.
- F. Fabricate miscellaneous anchorage devices and support brackets from steel shapes, plates and bars of sizes indicated to meet structural loading criteria. Where no thickness is indicated, 12 ga. is min. allowable.
- G. Fasteners, General: Provide type and size shown, or as required, for proper support and performance, fabricated of galvanized steel, finish to match adjacent surfaces. Bolts and nuts of zinc coated steel, complying with ASTM A307, Grade A (and ASTM A143), may be used for concealed assembly and anchorage in locations not exposed to the weather and joining steel members to steel members only.

2.06 GROUNDING MATERIALS

- A. Grounding Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - 1. Material above Finished Grade: Copper.
 - 2. Material on or below Finished Grade: Copper.

2.07 FABRICATION

- A. Tolerances: Verify dimensions on site prior to shop fabrication.
- B. Fabricate galvanized steel in accordance with AISI Steel Product Manual and the manufacturers requirements.
- C. Shop fabricate to designs indicated on Drawings and to meet performance requirements specified.
- D. Shop fabricate fittings, interfacing parts and assemblies so that field cutting adjustments are not necessary.
- E. Make exposed joints butt, flush, and hairline.

- M. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of the metal to be welded, and as required for color match, strength and compatibility in the fabricated items.
- N. Fasteners: Furnish of basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Unless otherwise shown, provide tamper-proof high-security galvanized steel carriage bolts with nuts for exposed fasteners.
 - 1. Basis of Design: KEY-REX fasteners, manufactured by Bryce Fastener, Inc., 1230 N. Mondel Dr., Gilbert, Arizona 85233, T. 800-558-1082.
 - 2. 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. Bryce Fastener, Inc.
1230 N. Mondel Dr., Gilbert, Arizona 85233
T. (800) 558-1082
 - b. Tamperproof Screw Company, Inc.
30 Laurel Street, Hicksville, NY 11801
T. (516) 931-1616
 - c. Tamper-Pruf Screws, Inc.
8808 Somerset Blvd.
T. (562) 531-9340
 - d. Or approved equal.
- O. Anchors and inserts: Either furnish inserts to be set in concrete or masonry work, or provide other anchoring devices as required for the installation of ornamental metal items. Provide toothed steel or lead shield expansion bolt devices for the drilled-in-place anchors. Provide galvanized or cadmium-coated anchors and inserts for exterior installations.
 - 1. Provide units with exposed surfaces matching the texture and finish of the metal item anchored.
- P. Fabrication: Bolt holes shall be drilled, all welding and fabrications shall be done prior to the application of hot-dip galvanization.
- Q. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
 - 1. Hot-dip galvanize posts and steel angles.
 - 2. Hot-dip galvanize custom-design fence panel frame and infill assemblies after fabrication.

2.03 MATERIALS

- A. Provide materials which have been selected for their surface flatness, smoothness and are free of surface blemishes where exposed to view in the finished unit. Surfaces exposed to view which exhibit pitting, seam marks, roller marks, "oil-canning" stains, discolorations or other imperfections on the finished units will not be acceptable.
- B. Stainless Steel
 - 1. Comply with the following standards for the forms and types of stainless steel for the required items of work.
 - a. Finish: No. 4, brushed;
 - b. Bolts and screws: ASTM F593; Alloy groups 1 and 2, non-magnetic;
 - c. Countersunk head cap screws: ASTM F879; Alloy groups 1 and 2, non-magnetic;
 - d. Nuts: ASTM F594; Alloy groups 1 and 2, non-magnetic.
- C. Galvanized Steel
 - 1. Hot-dip galvanizing shall be applied in accordance with:
 - a. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products;

1. East Driveway Gates: 11'-1", minimum.
 2. West Gates: 8'-1 3/4", minimum.
- D. Gate Posts: 5"x5"x1/4" (THK.) with 3/8" (THK.) pre-welded extension plates (as indicated in drawings).
- E. Galvanized-Steel Frames: Fabricate members from 2"x2" C-channel formed from 0.108-inch thickness, metallic-coated steel sheet or formed from 0.105-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication.
- F. Frame Corner Construction: Welded.
- G. Infill:
1. Material: Hot dipped galvanized carbon steel expanded laths.
 2. Basis of Design: Expanded laths manufactured by AMICO Building Products (3245 Fayette Ave., Birmingham, AL 35208), or approved equal.
 - a. Type 1: 1-10 R / galvanized carbon steel
 - b. Type 2: 3/4"-9(10)R / galvanized carbon steel
 - c. Type 3: 1/2"-13 R / galvanized carbon steel
- H. Fabricators: 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. Johnson Screen
708 Challenger Way, Forked River, NJ 08731
T. (609) 693-9434
 2. A & T Iron Works, Inc.
25 Cliff Street, New Rochelle, NY 10801
T. (800) 523-0973
 3. AMETCO Manufacturing Corporation
4326 Hamann Parkway, P.O. Box 1210, Willoughby, OH 44096
T. (800) 321-7042
 4. Or approved equal.
- I. Hinges: BHMA A156.1, Grade 1, suitable for exterior use.
1. Heavy-duty bolt-on stainless steel double-acting roller bearing hinge.
- J. Cane Bolts: Fabricated from 3/4-inch diameter, round steel bars, hot-dip galvanized after fabrication. Finish to match gates. Provide galvanized-steel pipe strikes to receive cane bolts in both open and closed positions.
- K. Gate Casters: Heavy-duty stainless steel casters with spring-loaded suspensions and brakes.
- L. Digital Lock with Key Override: BHMA A156.5, Grade 1, weatherproof, suitable for exterior use.
1. Basis of Design: Trilogy DL2700, manufactured by Alarm Lock, 345 Bayview Avenue, Amityville, New York 11701, T. 800-252-5625.
 2. 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. Alarm Lock
345 Bayview Avenue, Amityville, NY 11701
T. (800) 252-5625
 - b. LockState
1325 S. Colorado Blvd. Suite 400, Denver, CO 80215
T. (303) 317-3422
 - c. Schlage
P. O. Box 1210, Olathe, KS 66051
T. (888) 805-9837
 - d. Or approved equal.

3. AMETCO Manufacturing Corporation
4326 Hamann Parkway, P.O. Box 1210, Willoughby, OH 44096
T. (800) 321-7042
 4. Or approved equal.
 - B. Fence Dimensions: As indicated in drawings.
 - C. Posts: T-shaped galvanized steel beams, 8"x7" (WT 7x26.5).
 - D. Corner Posts: 5"x5"x1/4"(THK.) galvanized steel square tubes with pre-welded extension plates (as indicated in drawings).
 - E. Corner Posts at Gates: Galvanized steel I-beam, 8" x 8" (W 8x31)
 - F. Horizontal Rails: 4"x8"x1/2"(THK.) galvanized steel angles.
 - G. Fence Panel:
 1. Panel Frame: 2"x2" galvanized steel C-channel.
 2. Panel Infill Material: Hot dipped galvanized carbon steel expanded laths.
 3. Basis of Design: Expanded laths manufactured by AMICO Building Products (3245 Fayette Ave., Birmingham, AL 35208), or approved equal.
 - a. Type 1: 1-10 R / galvanized carbon steel
 - b. Type 2: 3/4"-9(10)R / galvanized carbon steel
 - c. Type 3: 1/2"-13 R / galvanized carbon steel
 - H. Frame Corner Construction: Welded.
 - I. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of the metal to be welded, and as required for color match, strength and compatibility in the fabricated items.
 - J. Fasteners: Furnish of basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Unless otherwise shown, provide tamper-proof high-security galvanized steel carriage bolts with nuts for exposed fasteners.
 1. Basis of Design: KEY-REX fasteners, manufactured by Bryce Fastener, Inc., 1230 N. Mondel Dr., Gilbert, Arizona 85233, T. 800-558-1082.
 - K. Anchors and inserts: Either furnish inserts to be set in concrete or masonry work, or provide other anchoring devices as required for the installation of ornamental metal items. Provide toothed steel or lead shield expansion bolt devices for the drilled-in-place anchors. Provide galvanized or cadmium-coated anchors and inserts for exterior installations.
 1. Provide units with exposed surfaces matching the texture and finish of the metal item anchored.
 - L. Fabrication: Bolt holes shall be drilled, all welding and fabrications shall be done prior the application of hot-dip galvanization.
 - M. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
 1. Hot-dip galvanize posts and steel angles.
 2. Hot-dip galvanize custom-design fence panel frame and infill assemblies after fabrication.
- 2.02 EAST DRIVEWAY AND WEST SWING GATES
- A. Gate Configuration: Double leaf.
 - B. Gate Frame Height: 8'-0".
 - C. Gate Opening Width:

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle and store products according to manufacturer's recommendations. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.
- C. Exercise care not to scratch, mark, dent, or bend metal components during delivery, storage, and installation. All touchups and replacement of damaged materials will be done by the contractor at no additional cost to the City of New York.

1.07 PROJECT CONDITIONS

- A. Verify actual dimensions by field measurements before preparation of shop drawings and fabrication; show recorded measurements on shop drawings.
- B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.08 CODE REQUIREMENTS

- A. All work shall be performed in accordance with the City of New York Building Code, or the requirements of this specification, whichever are more stringent.
- B. In case of any conflict between referenced codes and standards and/or the Contract Documents, the more stringent code or standard shall govern.

1.09 WARRANTY

- A. Unless stated otherwise in these specifications, warranty shall state that all work is in accord with drawings and specifications, as amended by any changes thereto authorized by the Commissioner, free from defects in materials and workmanship and weather tight for a period of one (1) years from the date of acceptance of the work by the Commissioner. All work shall remain free of structural failure for a continuous period of one (1) years. Contractor shall agree to repair or replace defective materials and workmanship to "like new condition", including such exploratory work, as necessary to determine the cause, during the warranty period, at no change to Contract Amount.
- B. The warranty, the enforcement or lack of enforcement thereof, shall not deprive the City of New York of other actions, rights, or remedies available to it. Warranty shall be in form approved by the Commissioner. Warranty does not cover damage resulting from vandalism or acts of nature exceeding performance criteria.

PART 2 PRODUCTS

2.01 GREEN FENCE

- A. Fabricators: 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. Johnson Screen
708 Challenger Way, Forked River, NJ 08731
T. (609) 693-9434
 - 2. A & T Iron Works, Inc.
25 Cliff Street, New Rochelle, NY 10801
T. (800) 523-0973

- 1.. SSPC PA-1 "Painting Application Specification", Steel Structures Painting Council.
 2. "Handbook on Bolt, Nut and Rivet Standards", Industrial Fasteners Institute.
 3. The Code for Welding in Building Construction issued by the American Welding Society (AWS).
 4. The specified documents of the American Society for Testing and Materials (ASTM).
 5. The specified documents of the Structural Steel Painting Council (SSPC).
 6. Steel finish designations issued by the American Iron and Steel Institute (AISI).
 7. The metal and alloy designations of the Uniform Numbering System (UNS).
 8. New York City Environmentally Preferable Purchasing (EPP) Minimum Standards for Construction Products.
- E. In case of any conflict between referenced codes and standards and/or the Contract Documents, the more stringent code or standard shall govern.
- F. Preinstallation Meetings: Conduct meetings including the Contractor, the Commissioner to verify project requirements, framing and support conditions, mounting surfaces and manufacturer's installation. Comply with DDC General Conditions.
- G. Fence and Gate Fabrication: Fences and Gates shall be fabricated in strict accordance with the plans and approved Shop Drawings. Posts and rails shall be formed into panels of the shapes on the plans and joints completely welded with welds of proper size and shape; all welds ground smooth to a neat finish. Connection shall be provided as indicated on the plans. Posts and pickets shall, in all cases, be truly vertical. Rails and bars shall be parallel to grade as shown on the plans.

1.05 SUBMITTALS

- A. Shop drawings: Submit for all items of work of this Section, include the following:
1. Plans, elevations, and detail sections.
 2. Indicate materials, methods, finishes, fittings, fasteners, anchorages, and accessory items.
 3. Provide setting diagrams and templates for anchorages, sleeves, and bolts to be installed by others.
 4. Where materials or fabrications are indicated to comply with design loadings, include material and safety factor properties, and other information needed for structural analysis.
- B. Samples: Submit fabricated samples of all items of work:
1. Samples to match the appearance, color, texture and all other characteristics of each finish required.
 2. Samples to show the complete range of variation in color, texture, and other characteristics resulting from the carefully controlled manufacture, finishing, fabricating, delivery, assembly, installation and cleaning processes.
 3. Samples to show finishes over materials welded together.
- C. 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.
- 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. Engineering Calculations: Submit engineering calculations described herein, concurrently with the corresponding shop drawings. All calculations shall bear the seal of a Professional Engineer registered in the State of New York.
- F. Submit maintenance manual:
1. At the completion of the project, submit a maintenance manual describing the various materials, equipment and procedures for cleaning and maintaining the work of this Section.

SECTION 32 3119 ~ DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.01 SUMMARY

- 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. Green Fence: 8-ft tall Galvanized steel fences with expanded metal laths.
 2. East Driveway Gates and Fence.
 3. West Gates and Fence.

1.02 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. DDC General Conditions
B. Section 05 50 00 "Miscellaneous Metals"
C. Section 09 90 00 "Painting and Finishing"

1.04 QUALITY ASSURANCE

- A. General: Work of this section shall be fabricated and installed by an experienced fabricator or manufacturer, who has been engaged in work of equivalent scope and fabrication standards for at least three (3) years. 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 be of highest quality 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. All work shall be accurately and neatly fabricated, assembled and erected.
- 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. Mock-Up: Provide a mock-up for evaluation of preparation techniques and installation workmanship.
1. Locate in areas designated by the Commissioner.
 2. Size: 1 panel and 2 post connections for all different types of fence designs/conditions.
 3. Do not proceed with remaining work until workmanship is approved by the Commissioner.
 4. Rework mock-up as required to produce acceptable work.
 5. Retain mock-up during construction as quality standard.
 6. Remove and legally dispose of mock-up when no longer needed.
 7. Incorporation: Incorporate mock-up into final construction at the approval of the Commissioner.
- D. Reference Standards: The work is subject to requirements of applicable portions of the following standards:

When the air temperature is less than 38°F in the shade, concrete shall be poured only with the approval of the Commisisoner and shall be adequately protected. If the air temperature falls below 50°F., an accelerator may be used. If the air temperature exceeds 85°F., a retarder may be used. Accelerators and retarders must be approved by the Commissioner before use.

- F. Perform slump tests on the first 3 trucks/batches at the beginning of the concrete placement operation to determine if material control has been established. Continue testing consecutive batches until the consistency meets the requirements of this section, and test thereafter at a rate of one test per 50 cubic yards.
- G. From the same samples taken for slump tests as specified herein, mold a sufficient number of concrete test cylinders to meet the requirements of this section.

END OF SECTION

1. Existing concrete sidewalks, adjacent to or abutting new curbs and interfering with the setting of said curbs shall be cut off to a line two (2') feet back of the curb concrete and parallel thereto, unless otherwise provided or directed by the Commissioner. Cutting shall be done by means of an approved power driven cutting machine with a carborundum cutting wheel. Cuts shall be a minimum depth of one and one-half (1-1/2") inches. The space between the curb and sidewalk shall be filled with concrete sidewalk colored to correspond to the adjacent walk.
2. No concrete sidewalk shall be cut off or otherwise disturbed until the same has been examined by the Commissioner.

K. Curb Joints

1. In constructing concrete curb in areas where existing concrete sidewalk abuts the curb or new concrete sidewalk will be laid immediately behind the curb, curb joints shall be made to coincide with sidewalk expansion joints. Also, all joints between sections of curb shall be filled with preformed expansion joint material in accordance with the requirements specified for filling sidewalk expansion joints.

3.03 FIELD QUALITY CONTROL - CONCRETE

- A. Cement shall be dry, free from lumps and have a temperature less than 170°F.
- B. For concrete exposed to view, the Contractor shall not use more than one (1) brand, unless otherwise permitted.
- C. Product Measurements
 1. Cement shall be measured by weight, or in full bags of 94 pounds each. When cement is measured by weight, it shall be weighed on a scale separate from those used for the other materials. After weighing, the entire contents of the hopper shall be completely discharged. When the cement is measured in bags, no fractions of bags shall be used unless weighed. Bags of cement shall be taken from the place of storage and placed adjacent to the mixer, in separate piles containing the exact number of bags for each mixer charge. Each pile shall be emptied into the mixer for each charge.
 2. Aggregates shall be measured by weight. Batch weights shall be based on saturated surface-dry materials and shall be corrected to take into account the weight of surface moisture contained in the aggregate.
 3. Water shall be measured by volume or by weight. The device for the measurement of the water shall be readily adjustable and, under all operating conditions, shall be accurate within 1.0 percent of its maximum capacity.
- D. The concrete batching plant requirements, the handling, measuring, and batching of the concrete materials, and the mixing, transporting, and discharging of the concrete, shall be equal to the requirement specified therefore in Subsection 501-3.02, 502-3.03, and 501-3.04 of the current Standard Specifications, Construction and Materials, of the New York State Department of Transportation, Office of Engineering.
- E. The concrete at the time of pouring shall be maintained at a temperature of not less than 50°F or more than 90°F. When the air temperature exceeds 85°F., the concrete subsequent to initial set shall be protected for three (3) days after pouring so as to prevent it from going above 90°F.

Section 31 00 00 - Earthwork and the pavement restored in accordance with the applicable sections of the NYCDOT Specifications, latest edition.

C. Underlying Material

1. The material underlying concrete curbs shall be satisfactory and thoroughly compacted per Section 31 00 00 - Earthwork. If unsatisfactory, the unsuitable material shall be removed and replaced with acceptable material and be thoroughly compacted.

D. Forms

1. Forms shall be either of metal of sufficient thickness, but not less than one-eighth ($1/8"$) inch, to satisfactorily resist distortion when fastened together and secured in place, or be of acceptable planed and matched lumber of sufficient thickness to resist distortion, rigidly held in position and of such construction that a smooth surface will be provided. Forms shall have suitable metal dividing plates approximately three-sixteenths ($3/16"$) inch thick; be of a depth including dividing plates not less than that of the curb, be properly located with tops at grade and be left in place until the concrete has hardened.
2. On curves, forms shall be of such construction as to provide true arcs with radial joints.

E. Workmanship

1. Concrete curb shall be built in independent sections ten ($10'$) feet long, except as otherwise specified, and shall have smooth plane ends separated by one-quarter ($1/4"$) inch joints. Concrete shall be placed and compacted in accordance with the requirements of Subsections 4.06.7.(C) and 4.06.7.(D), NYCDOT Specifications (latest edition). In depositing, the concrete shall be tamped and the aggregate shall be carefully spaded away from the front forms. Curb shall be set across driveways with the top below grade, as required, and the ends of the sections adjacent to the depressed curb shall be rounded or splayed as required, in accordance with NYCDOT Standard Drawings, latest edition.

F. Shape

1. The top shall pitch one-quarter ($1/4"$) inch downward toward the front. The back shall be perpendicular to the base. The top front edge of plain concrete curb shall be rounded to a one ($1"$) inch radius.

G. Surface Finish

1. The top shall be finished by trowelling and finally by using wooden floats. Upon the removal of the forms, the exposed faces shall be rubbed to a smooth and uniform surface. The color of the finished curb shall be uniform.

H. Backfilling

1. Backfilling shall follow the removal of the forms as soon as practicable and shall be of clean earth or other approved material satisfactorily compacted.

I. Surface Curing and Protection

1. Concrete curb shall be carefully protected against injury from rain, frost, the drying effects of the sun and wind, traffic or other causes, by means of suitable guards and covering. The concrete shall be cured in compliance with the requirements of Section 2.14, Type 1-D, clear, NYCDOT Specifications (latest edition).

J. Sidewalks to be Cut Off

- K. The compressive strength, average of not less than three cylinders or cores, at 28 days shall be 4,000 psi tested in accordance with ASTM C39. Mold and store test cylinders meeting the requirements of ASTM C31.
- L. Slump shall be a minimum of 1.5" and a maximum of 3.5". The slump requirement shall apply at the point of discharge. The Contractor shall supply at each point of concrete delivery a slump cone and rod conforming to the requirements of ASTM C143 for use by Commisisoner.
- M. Rolling and Compaction
 - 1. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition.
 - 2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- N. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling with hot material.
 - 1. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
 - 2. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
 - 3. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphaltic concrete. Compact by rolling to maximum surface density and smoothness.
 - 4. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.02 CONCRETE CURB

- A. General
 - 1. The Contractor shall complete all curb construction before commencing any roadway grading operation; stripping, removing or placing any pavement; or commencing sidewalk work unless otherwise permitted by the Commissioner, in writing.
 - 2. The Contractor will be permitted to encroach upon the area immediately adjacent to the curb only to the extent essential for curb construction.
- B. Excavation
 - 1. Excavation shall be made to dimensions sufficient to permit the setting of forms. Where recurbing is required and there is no scheduled item for wearing course and/or concrete base, in excavating for curb trench, the removal of a width of not more than one (1') feet of roadway pavement along the curb will be permitted.
 - 2. At the completion of curb setting, the roadway strip shall be backfilled to the subgrade of the pavement base, the backfill thoroughly compacted to the satisfaction of the Commisisoner and

E. Aesthetic Finish

1. Per Commissioner direction, concrete aesthetic finish will match that produced in other areas of the Project. Contractor to ensure means, methods, and quality control is in accordance with the design intent of City of New York.
2. Concrete flag control joints will be saw-cut by Contractor after 2-3 days of curing, but before 5 days of curing to avoid dry shrinkage. Contractor to gauge the condition of the cured concrete and cut control joints at optimum curing time. Contractor to ensure proper curing procedures to avoid dry shrinkage before control joints are cut.
3. Any damaged concrete (as a result of the saw-cuts, dry shrinkage, etc.) is to be removed and replaced by the Contractor at own expense.
4. Control joint saw-cuts will be 1/4-inch-wide and 3/8-inch-deep. Care will be taken to avoid damage to steel reinforcement. Cutting shall be done by means of an approved power driven cutting machine with a carborundum cutting wheel.
5. Contractor to submit shop drawing of control joint layout. Contractor to inform Commissioner of any need to deviate from the control-joint layout as a result of site conditions.
6. After completion of floating and troweling, Contractor to eliminate all tool marks on concrete surface and broom finish by drawing fine-hair broom across surface perpendicular to line of traffic. Repeat as necessary to obtain a fine line texture.

F. Do not remove forms for twenty four hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. As directed, remove and replace sections with major defects at no cost to City of New York.

G. Backfilling shall follow the removal of forms as soon as practicable and, unless otherwise permitted, shall be of clean earth, satisfactorily compacted.

H. Protection

1. Concrete sidewalk shall be carefully protected against injury from rain, frost, the drying effects of the sun and wind, traffic or other causes, by means of suitable guards and covering. Any damaged/vandalized concrete shall be replaced by the Contractor at no cost to the City of New York.
2. Concrete shall be covered with a curing and anti-spalling material such as Durok Shield as manufactured by Durok Building Materials, Inc., Hastings-on-Hudson, N.Y. 10706; Duraltone as manufactured by Dural International, Inc., Deer Park, N.Y. 11729; Hydrozo Concrete Cure and Hydrozo Clear as manufactured by Hydrozo Coatings Co., Lincoln, Nebraska 68051; or an approved equal; and shall be applied in accordance with instructions of the manufacturer.

I. Where directed by Commissioner, asphaltic concrete mixture shall be placed adjacent to newly constructed sidewalk as required to meet site grades.

J. Concrete shall be mixed by an approved NYCDOT method indicated below:

1. Method A - Central Plant Mix: Concrete produced at an approved plant, ready for use prior to discharge into a transporting vehicle.
2. Method B - Truck Mix: Concrete whose constituent materials are proportioned at a central plant and mixed with water in a transporting vehicle.
3. Method C - Job Mix: Concrete whose constituent materials are proportioned at a central plant and mixed at the job, or concrete whose constituent materials are proportioned and mixed at a job plant.

1. Excavation shall be made to dimensions sufficient to permit the setting of forms. The earth subgrade, immediately before foundation material is placed on it, shall be compacted, smooth, parallel to and at the required depth below the finished sidewalk surfaced and be dampened with water sufficient only to be absorbed by the subgrade. The subgrade shall not be in a muddy or frozen condition and unsuitable material shall be removed and replaced with acceptable material thoroughly compacted.

B. Stone base

1. Base material shall be placed on the prepared subgrade and thoroughly compacted into lifts equal to the smaller of 6-inches in the full section thickness. Unsatisfactory subgrade material shall be removed and replaced with acceptable material and shall be thoroughly compacted to the satisfaction of the Commissioner. The excavated material shall become the property of the Contractor and shall be removed from the site to the Commissioner's satisfaction. The top surface shall be parallel to the finished grade and at a distance below the grade equal to the specified thickness of concrete. Additional depth of base material for special conditions shall be placed as required by the Commissioner.

C. Concrete Sidewalk Installation

1. Forms shall be made of substantial material with suitable metal dividing plates and of sufficient strength to satisfactorily resist distortion when fastened together and secured in place. Forms and dividing plates shall be of a depth not less than that of the concrete sidewalk, be properly located with tops set to the designated sidewalk surface and be left in place until the concrete has hardened.
2. Concrete sidewalk shall be built in maximum twenty foot slabs between expansion joints. For concrete curb installation within the Public Right of Way, expansion joints in sidewalk shall coincide with expansion joints in curb.
3. Expansion joints shall be one-half (1/2) inch width and shall be filled with preformed joint filler within 1 - inch of the sidewalk surface. The top 1- inch shall be sealed with poured self-leveling joint filler.
4. Base material shall be wetted immediately before concrete is placed. The concrete shall be placed within the forms and thoroughly tamped until the surface is at the finished grade.

D. Welded Wire Fabric

1. Steel wire fabric shall be made up in sections of the length and width required. They shall be fastened together in an approved manner at each intersection.
2. Steel wire fabric shall be protected from moisture, and, when placed in the work, shall be free from grease, injurious rust, dirt or other foreign substances.
3. Steel wire fabric shall have transverse or longitudinal end members overlapping each other by not less than a full mesh length or width respectively. Overlapping sheets shall be securely and properly fastened.
4. Steel reinforcement shall be supported at the specified depth in such a manner that no displacement will occur during concreting operations. It shall be supported either on approved devices or upon a layer of concrete which has been evenly struck off. The method of supporting the steel at the proper elevation shall be approved by the Commissioner.
5. Steel wire fabric shall be laid in sheets which shall be straight and true to form and shall be securely held in position by approved methods so that they will be in their prescribed position after the concrete has been thoroughly compacted.

1/8"	32-62	± 7	36-65	± 7
#20	15-39	± 7	15-39	± 7
#40	8-27	± 7	8-27	± 7
#80	4-16	± 4	4-16	± 4
#200	2-8	± 2	2-6	± 2
Bitumen percent by weight soluble in chloroform	4.5-6.5	± 0.4	5.8-7.0	± 0.4

- H. Asphaltic Concrete Tack Coat (excluding that used for paver mastic) shall be rapid curing liquid asphalt conforming to ASTM D2028 Grade RC-70, and shall be a product of fluxing an asphaltic residuum with a distillate. Liquid asphalt shall be homogeneous and free from water.

2.05 STEEL FACING

- A. Steel facing shall conform to Section 2.12 "Curb - Steel Facing" of New York City Department of Transportation Standards, latest edition.
- B. Steel facing shall be Type D-bent plate.

2.06 CONCRETE CURB

- A. Concrete for curb shall comply with the requirements of Section 3.05, NYCDOT Specifications (latest edition), Class B-32, Type IIA. Cement shall be Type II Portland. Coarse aggregate shall be broken stone or gravel and comply with the requirements of Section 2.02, NYCDOT Specification (latest edition), Type 1, Grade B, or Type 2, Size No. 57. An approved air-entraining agent shall be added at the time concrete ingredients are mixed with water.
- B. Where proposed adjacent sidewalk is designated to be pigmented, curb shall also be pigmented to match in color. Pigmenting material shall comply with the requirements of Section 2.19, NYCDOT Specifications (latest edition).

PART 3 EXECUTION

3.01 CONCRETE SIDEWALK

- A. Excavation and Subgrade

Solubility in trichloroethylene, %	99	-	99	-
Test on residue from thin-film oven test (TFOT):				
Loss on heating, %	-	0.50	-	0.50
Ductility, 60F (15.5C), 5 cm/min., cm.#40	40 *	-	30 *	-
Viscosity Ratio @ 140F (60C), poises after: before TFOT	-	4 *	-	4 *

- C. The above requirements denoted with an asterisk (*) may deviate for asphalt cements refined from Domestic Mid-continent, Canadian, or Boscan crudes with prior approval of the Commissioner.
- D. Sand shall be of NYCDOT Type 2A or 2B and shall consist of clean, hard, durable, rough-surfaced mineral particles. Sand shall not contain any deleterious substances in excess of that shown in Table 1 of ASTM C33.
- E. Coarse aggregate for binder mix shall be a NYCDOT Type 1, Grade B, AASHTO size No. 57 stone. Coarse aggregate for fine-mix surface course shall be a NYCDOT Type 1, Grade A, AASHTO size No. 8 stone.
- F. Mineral dust shall be limestone or other approved dust, be thoroughly dry when delivered, be of one grade, and contain no more than 50% free silicon dioxide. Dust shall have a record of satisfactory performance in pavements for not less than three (3) years. Mineral dust shall not be permitted in Binder Mixture.
- G. Aggregate within asphaltic concrete mixes shall comply with the following sieve analyses:

Sieve Size	Binder Course		Fine-Mix Surface Course	
	% Passing	Tol. (%)	% Passing	Tol. (%)
1 1/2"	100	-		
1"	95-100	-	100	-
1/2"	70-90	± 6	90-100	-
1/4"	48-74	± 7	65-85	± 7

Class Of Concrete	Nominal Size Of Coarse Aggregate Used (Inches)	Bags of Cement Per Cubic Yard Of Freshly Mixed Concrete (Minimum)	Fine Aggregate Percentage By Weight of Total Aggregate
Class 8-32	1.5	6.0	29 to 37

- C. The volume of freshly mixed concrete shall be assumed to be the absolute volume of the cement, plus the volume of the unabsorbed water, plus the absolute volume of the aggregates in a saturated surface-dry condition, plus entrained air.
- D. Quantity of fine aggregate may be varied within the limits indicated according to the type of coarse aggregate used, in order to obtain a smooth, dense, homogeneous and plastic mixture.
- E. Air-entrained concrete shall have an air content of 5.5% with a tolerance of 1.5%.

2.03 FILLER, EXPANSION JOINT, PREFORMED

- A. Preformed Expansion Joint Filler shall be non-extruding and one-half (1/2) inch thick. The filler shall conform to either NYCDOT Type IV: Bituminous Fiber, conforming to ASTM Designation D 1751; closed cell neoprene, or approved equal.

2.04 ASPHALTIC CONCRETE WEARING COURSE AND BINDER COURSE

- A. Asphaltic concrete wearing course shall consist of a binder mixture and a fine-mix asphaltic concrete surface course mixture in layer thicknesses indicated on Drawing.
- B. Asphaltic cement shall comply with the requirements of ASTM D946, except that the ductility test shall be run at 60 degrees Fahrenheit and that the petroleum derivative in the Spot Test with standard naphtha solvent in 24 hours shall be negative. Asphaltic cement shall be NYCDOT viscosity grade AC-20 meeting the requirements listed below and shall be either fluxed natural asphalt or residual asphalt derived from the distillation of asphaltic petroleum.

NYCDOT Grade	AC-10		AC-20	
Requirements	Min.	Max.	Min.	Max.
Viscosity @ 140F(60C), poises	800	1200	1600	2400
Viscosity @ 275F(135C), Cs.	250 *	-	300 *	-
Penetration, 77F(25C) 100g, 5 sec.	70 *	-	60 *	-
Flash Point, COC, F	425	-	450	-

- A. Base material as specified in Section 310000.
- B. Aggregate shall be broken, clean, hard, un-weathered stone of uniform quality. It shall consist of fragments roughly cubicle or pyramidal in shape.

2.02 CONCRETE

- A. Concrete shall conform to NYCDOT, 4,000 psi: Normal Air-entrained concrete; a homogeneous mixture of the following:
 - 1. Portland Cement
 - a. Portland cement shall conform to NYCDOT Type 1: Normal. Cement shall be uniform in color. The brand shall have an established reputation of uniformity of character and have been successfully used in the United States for at least two (2) years. Cement shall be stored in such a manner as to permit easy inspection and to protect the cement from dampness and minimize warehouse set. Portland cement shall comply with the requirements of ASTM C 150.
 - 2. Fine Aggregate
 - a. Sand shall consist of clean, hard, durable, angular, rough-surfaced mineral particles and conform to NYCDOT Type 1A.
 - b. Fineness Modulus of all sands shall not vary more than plus or minus 0.20 from the first approved test sample.
 - c. Sand shall not contain any deleterious substances in excess of that shown in Table 1 of ASTM Designation C 33. The calculated quantity of sodium chloride shall not exceed three-tenths (0.3) of one percent, by weight.
 - 3. Coarse Aggregate
 - a. Course Aggregate shall be broken, clean, hard, un-weathered stone of uniform quality and conform to NYCDOT Type 1, Grade B: Moderately Resistant to Abrasion, Size No. 57, ASTM Designation C-33.
 - 4. Steel Reinforcement for Concrete Sidewalk
 - a. Steel bars should be Type 1 - Deformed Billet Steel Bars complying with the requirements of ASTM Designation A-615, Grade 40 or 60.
 - b. Steel bars shall be Grade 60 unless otherwise specified. Size of bars as specified in the Contract Drawings. Unless exact lengths are specified, bars shall be furnished in stock lengths in multiples from 20 feet and up.
 - c. Reinforcing steel mats shall be free from dirt, oil, grease, paint, loose mill scale, or thick rust which could impair bond of the steel with the concrete. Before being placed, all reinforcement shall be in a condition that is approved by the Commisisoner. All steel reinforcement shall be placed as shown on the Contract Drawings.
 - 5. Welded Wire Mesh Fabric
 - a. Welded wire mesh fabric to comply with requirements of ASTM Designation A-1064.
 - b. Welded wire mesh fabric to be 6 x 6, W2.9 x W2.9 unless otherwise specified.
- B. Based on dry-rodded volumetric measurement of ingredient materials, concrete shall conform to the following properties, approximately equal to a "1:2:3½" mix:

- h. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- i. ASTM C 618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Uses as a Mineral Admixture in Portland Cement Concrete
- j. ASTM C 311, Standard Methods of Sampling and Testing Fly Ash and Natural
- k. ASTM C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars
- l. ASTM D946 Penetration Graded Asphalt Cement for use in Pavement Construction
- m. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb (4.54 Kg) Hammer and 18 inch (457 mm) Drop
- n. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), Method B (Direct Transmission)
- o. ASTM D424 - Standard Method of Test for Plastic Limit
- p. ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- q. ASTM C136 - Method for Sieve Analysis for Fine and Coarse Aggregate.
- r. ASTM C979 - Specification for Pigments for Integrally Colored Concrete.
- s. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
- t. ASTM D698 - Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5-lb (2.49 kg) Rammer and 12 in. (305 mm) drop.
- u. ASTM D1559 - Test Method for Resistance of Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- v. ASTM D2028 - Standard Specification for Cutback Asphalt (Rapid-Curing Type)
- 5. Standard Practice AASHTO M 226.R1, Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete

1.11 JOB CONDITIONS

A. Weather Limitations:

- 1. Concrete placement operations are limited by the stipulations laid out in the NYCDOT standard specifications, Subsection 4.05.5.B.
- 2. Asphaltic concrete placement operations are limited by the stipulations laid out in NYCDOT standard specifications, Subsection 4.02.4.C

B. Quality Assurance

- 1. Manufacturer Qualifications: manufacturer must be approved by NYCDOT.
- 2. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- 3. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of NYCDOT for paving work.

PART 2 PRODUCTS

2.01 STONE BASE

FDNY NEW FIREHOUSE FOR RESCUE COMPANY 2
1815 STERLING PLACE, BROOKLYN, NY

PAVEMENT
32 2000 - 4

Licensed Professional Land Surveyor. This survey may be combined with other as-built survey requirements of site-work items, with the approval of the Commissioner. Marked-up design plans are not acceptable for the requirements of this section.

1.09 RELATED SECTIONS AND DOCUMENTS

- A. Project Specifications:
 - 1. Section 02 20 50 - Protection of Existing Utilities
 - 2. Section 31 00 00 - Earthwork
 - 3. Section 31 25 00 - Erosion and Sedimentation Controls
- B. Contract Documents and Contract Drawings.
- C. NYCDOT Standard Drawings and Specifications, latest editions.
- D. Approved Builders Pavement Plans.
- E. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.10 REFERENCE STANDARDS

- A. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by NYCDOB and NYCDOT governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. The latest edition, as of the date of the executed construction contract, of referenced standards listed below applies to this contract.
 - 1. New York City Building Code, latest edition.
 - 2. City of New York Department of Transportation (NYCDOT) Standard Details of Construction, latest edition.
 - 3. New York State Department of Transportation Office of Engineering Standard Specifications latest edition.
 - 4. American Society for Testing Materials (ASTM):
 - a. ASTM C33 - Standard Specification for Concrete Aggregates
 - b. ASTM C143 - Standard Test Method For Slump of Hydraulic Cement Concrete
 - c. ASTM C150 - Standard Specification for Portland Cement
 - d. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 - e. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - f. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - g. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field

1. Material Certificates: Submit materials certificate to the Commissioner which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein and applicable regulatory requirements.
2. Concrete Design Mix: Before the contractor begins to manufacture concrete, he shall secure the Commissioner approval of the formula he proposes to use. The formula shall comply with NYCDOT requirements. He shall submit for this purpose a statement, in writing, of the sources of all ingredient materials, the type and brand of the cement and the number of pounds of each of the materials in a saturated surface-dry condition making up one cubic yard of concrete. The range of water-cement ratios within which the concrete will be manufactured and the method of mixing to be employed shall also be stated. The approved formula shall not be changed without written permission of the Commissioner.

1.04 COMMISSIONER'S RESPONSIBILITIES

- A. The Commissioner will retain an independent testing agency to perform material testing as required for Special Inspections. The Contractor shall provide any necessary assistance to the testing agency and provide the testing agency with the intended construction schedule at least one week prior to the start of construction.

B. NYC DOB Special Inspections:

City of NY will retain an independent testing agency to perform special inspections as required by the NYC Building Code.

1.05 CONTRACTOR RESPONSIBILITIES

- A. Contractor is responsible for coordinating this work with other trades on-site.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials as recommended by the manufacturer to protect from damage and spoils.

1.07 PERMITS AND APPROVALS

- A. Contractor shall prepare and obtain all required permits prior to construction unless otherwise directed by Commissioner. Copies of all permits shall be supplied to the Commissioner prior to the commencement of work authorized by the permit.
- B. Contractor shall perform Public Right of Way work as per approved Builders Pavement Plans.

1.08 PROJECT RECORD DOCUMENTS

- A. Upon completion of the work of this and related sections, the contractor shall provide the Commissioner with an as-built survey of all new site improvements. The data shall include grade elevations tied into established project benchmarks. The survey shall be provided in digital (AutoCAD DWG) and paper formats, and shall be signed and sealed by a New York State

SECTION 32 2000 - PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Work of this section, as shown or specified, shall provide onsite and Right of Way pavement installation including concrete sidewalk, and steel faced concrete curbs in accordance with the requirements of the Contract Documents.
- B. The Contractor must accept the site as-is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.
- C. All pavement installation within the Public Right of Way is to adhere to the standards and specifications of the New York City Department of Transportation (NYCDOT), latest editions and shall be completed as per the approved Builders Pavement Plan.
- D. Contractor to arrange and pay for all NYCDOT inspections for work within the Public Right of Way as required by NYCDOT.

1.02 WORK INCLUDED

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, certificate costs, services, filing fees, testing costs, security, and all other associated or related items specified herein that are necessary and are required to complete the Work. Work elements shall include:
 - 1. All onsite pavement is under jurisdiction of City of New York Department of Buildings (NYCDOB). Pavement work covered within the Public Right of Way will be as per the latest City of New York Department of Transportation (NYCDOT) standards and specifications, as applicable.
 - 2. Construct all concrete sidewalks, pavements, pedestrian ramps, concrete curbs, steel faced concrete curbs, granite curbs, drop curbs, tree pits, asphaltic concrete pavement, interlocking concrete pavers, pavement markings, and items shown on Drawings, specified herein, and as required by site conditions, NYCDOB, and NYCDOT.
 - 3. Pay for special inspections required by NYCDOB and NYCDOT to ensure compliance with NYCDOB and NYCDOT requirements.

1.03 SUBMITTALS

- A. No work shall be performed until shop drawings, as required, have been reviewed and accepted by the Commissioner.
- B. The Contractor must provide the following submittals to the Commissioner for approval prior to purchase of materials:

- B. Remove and replace unit pavers and stone that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units as intended. 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.
- C. After the work is installed, it shall be the responsibility of the Contractor to see that the pavement is properly and adequately protected from damage. Suitable protection shall be required wherever necessary, but no lumber that may stain or deface the pavement shall be used. All fastenings and nails used in conjunction with protecting devices shall be non-staining. All pavement work in progress shall be protected at all times during construction by use of a suitable strong, impervious film or fabric securely held in place.

3.05 FINAL CORRECTIONS

- A. The City of New York and the Commissioner reserve the right to inspect the work to determine if adjustments are necessary in grade, alignment or layout. The Contractor shall make such adjustments without further compensation.

END OF SECTION

- G. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
- H. Follow manufacturer's written instructions for installation on pedestals.

3.02 GRADES AND ELEVATIONS

- A. The Drawings indicate, in general, the alignment and finish grade elevations. The Commissioner may make such adjustments in grades and alignments as are found necessary to properly complete the work. The Contractor shall not receive further compensation for adjustments.

3.03 DRYPACK SETTING-BED APPLICATIONS

- A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply DryPack-bed bond coat over surface of concrete subbase about 15 minutes before placing Dry Pack bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch thickness for bond coat.
- C. Apply Dry Pack bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.
- D. Mix and place only that amount of Dry Pack bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.
- E. Place pavers before initial set of cement occurs. Immediately before placing pavers on DryPack bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to mortar bed or to back of each paver with a flat trowel.
- F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- G. Spaced Joint Widths: Provide 3/8-inch nominal joint width with variations not exceeding plus or minus 1/16 inch
- H. DryPack Joints: DryPack paver joints complying with ANSI A108.10.
- I. DryPack joints as soon as possible after initial set of setting bed.
 - 1. Force DryPack into joints, taking care not to smear grout on adjoining surfaces.
 - 2. Tool exposed joints slightly concave when thumbprint hard.
- J. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.
- K. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
 - 1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.

3.04 REPAIR, POINTING, CLEANING, AND PROTECTION

- A. All rules and regulations governing respective utilities shall be observed in executing all work under this Section. All work shall be executed in such a manner as to prevent any damage to existing trees, curbs, pavement, walls, rails, utility lines, structures, and adjoining property.

- | | |
|--------|--------|
| No.16 | 70-100 |
| No.30 | 40-75 |
| No.50 | 20-40 |
| No.100 | 10-25 |
| No.200 | 0-10 |
- b. Fracture, by weight, minimum: 75%.
 - c. Sand Equivalent, minimum: 40%.
 - d. 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.
 - e. Color of Sand: Provide natural dark color (not white) selected and approved by the Commissioner as determined by color selection of joint filler.
2. 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 determined by the Commissioner's color selection.

2.08 PEDESTAL SYSTEM

- A. Products: Subject to compliance with requirements, paver suppliers that may be incorporated into the Work include, but are not limited to, the following:
- 1. Wausau Tile, Inc.
9001 Bus. Hwy 51, Rothschild, WI 54474
T. 715-359-3121
 - 2. Hanover Architectural Products
5000 Hanover Road, Hanover, PA 17331
T. 717-637-0500
 - 3. Tile Tech Pavers
4730 East 26th Street, Vernon, CA 90058
T. 213-380-5560
 - 4. Or approved equal.
- B. Basis of Design: Terra-Stand System by Wausau Tile, Inc.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Before laying of pavers, the Commissioner shall inspect and approve the concrete base.
- 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 pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible:
 - 1. For concrete pavers, a block splitter may be used.
- D. Joint Pattern: As shown on Drawings.
- E. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- F. Expansion and Control Joints: Provide cork joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Cold Spring Granite
17482 Granite West Road, Cold Spring, MN 56320
T. 800-328-5040
 - b. Architectural Craft Stone Source, Inc.
150-28 Union Turnpike, Suite 105, Flushing, NY 11367
T. 718-820-8885
 - c. Polycor Inc.
139, St-Pierre Street
Quebec (Quebec) Canada G1K 8B9
T. 1-418-692-4695
 - d. Or approved equal.
2. Granite Color: Match granite setts selected by the Commissioner.
3. Top Width: 4-inch.
4. Face Height: 4-inch.
5. Total Height: 18-inch.
6. Finish: Thermal (face) & Thermal (top)

2.05 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Base: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
- B. Drainage Geotextile: Nonwoven needle-punched geotextile fabric, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 1. Apparent Opening Size: No. 40 [0.425-mm] sieve, maximum; ASTM D 4751.
 2. Permittivity: 0.5 per second, minimum; ASTM D 4491.
- C. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

2.06 DRYPACK SETTING-BED MATERIALS

- A. DryPack Setting Bed: 1 part Portland cement and 3 parts sand as follows:
 1. Portland Cement - ASTM C150 - Type 1; white.
 2. Aggregate for Cement Setting Beds: Sand as recommended in ASTM C398, uniformly graded from coarse to fine, with 100% passing thru No. 4 sieve and not more than 5% passing the No. 100 sieve.
- B. Factory-blended Dry Pack containing Portland cement meeting ASTM C 105, Type II and washed plaster sand meeting ASTM C 144.
- C. Water: Potable.

2.07 JOINT MATERIALS

- A. Joint Filler (DryPack): 1 part joint sand to 3 part Portland cement, mixed thoroughly.
 1. Sand: Joint sand shall conform to the following gradation in accordance with C144-84 and shall be a combination of manufactured sand and natural sand:
 - a. Percent Fines
- | | |
|------------|-----------|
| Sieve Size | By Weight |
| No.4 | 100 |
| No.8 | 95-100 |

- b. Thickness: 2-1/2 inch.
- c. Face Size: 3-3/4-inch by 3-3/4-inch.

2.03 CONCRETE PAVERS

- A. Pavers made from concrete complying with ASTM C936-82.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Wausau Tile, Inc.
9001 Bus. Hwy 51, Rothschild, WI 54474
T. 715-359-3121
 - b. Hanover Architectural Products
5000 Hanover Road, Hanover, PA 17331
T. 717-637-0500
 - c. Tile Tech Pavers
4730 East 26th Street, Vernon, CA 90058
T. 213-380-5560
 - d. Or approved equal.
 - 2. Paver type D:
 - a. Basis of Design: UG 60 by Wausau Tile.
 - b. Thickness: 2 inch.
 - c. Face Size: 24-inch by 24-inch.
 - 3. Paver type E:
 - a. Basis of Design: UG 10 by Wausau Tile.
 - b. Thickness: 2 inch.
 - c. Face Size: 12-inch by 12-inch.

2.04 CURBS AND EDGE RESTRAINTS

- A. Aluminum Edge Restraints.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Permaloc Corporation
13505 Barry Street, Holland, Michigan 49424
T. 616-399-9600
 - b. American Hydrotech, Inc
303 East Ohio Street, Chicago, IL 60611
T. 312-337-4998
 - c. ZinCo USA, Inc.
471 Page Street Unit 5, Stoughton, MA 02072
T. 866-766-3155
 - d. Or approved equal.
 - 2. Basis of Design: GeoEdge by Permaloc Corporation
 - a. Dimensions: 7.5" x 8.5"
 - b. Material: Extruded aluminum.
 - c. Connection Method: Section ends shall splice together with aluminum sliding connector on wall and base.
 - d. Finish: Mill Finish.
- B. Granite Curbs: Granite curbing, with face battered 1 inch per foot (1:12), produced in random lengths not less than 36 inches from granite complying with ASTM C 615.

2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.

PART 2 PRODUCTS

2.01 GRANITE PAVERS

- A. Granite Pavers: Rectangular paving slabs made from granite complying with ASTM C 615, with compressive strength greater than or equal to 5,000 psi.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Cold Spring Granite
17482 Granite West Road, Cold Spring, MN 56320
T. 800-328-5040
 - b. Architectural Craft Stone Source, Inc.
150-28 Union Turnpike, Suite 105, Flushing, NY 11367
T. 718-820-8885
 - c. Polycor Inc.
139, St-Pierre Street
Quebec (Quebec) Canada G1K 8B9
T. 1-418-692-4695
 - d. Or approved equal.
 2. Paver Type A:
 - a. Basis of Design: Mesabi Black / Diamond 100 by Cold Spring Granite
 - b. Thickness: 2-1/2 inch.
 - c. Face Size: 12-inch by 12-inch.

2.02 GRANITE SETTS

- A. Granite Setts: Square paving units made from granite complying with ASTM C 615, with compressive strength greater than or equal to 5,000 psi.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Eurocobble
4265 Lemp Avenue, Studio City, CA 91604
T. 877-877-5012
 - b. Hanover Architectural Products
5000 Hanover Road, Hanover, PA 17331
T. 717-637-0500
 - c. Coldspring
17482 Granite West Road, Cold Spring, MN 56320
T. 800-328-5040
 - d. Or approved equal.
 2. Paver Type B:
 - a. Basis of Design: Gray Mix 1 / Thermal (top) & Split (sides) by Eurocobble.
 - b. Thickness: 2-1/2 inch.
 - c. Face Size:
3-3/4" by 3-3/4" (individual setts) / 19-3/4" by 19-3/4" (preassembled multi-sett units).
 3. Paver Type C:
 - a. Basis of Design: Sierra White / Thermal by Coldspring

6. PCA: Portland Cement Association.
 7. Standard Specifications: New York State Department of Transportation, Standard Specifications Construction and Materials, 1995 Edition, and addenda.
- C. Installer Qualifications: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for the proper performance of the work of this Section.
1. Minimum Years of Experience: 3 years.
- D. Source Limitations: Obtain each type of unit paver, joint material, and setting material from one source with resources to provide a sufficient quantity of materials and products of consistent quality in appearance and physical properties.
- E. Layout and Grading: After staking out the work, and before beginning final construction, obtain the Commissioner's approval for layout and grades.
1. The Contractor shall stake out the work in sufficient detail for evaluation by the Commissioner.
 2. The Commissioner shall be permitted to make reasonable adjustments to layout and grading without further compensation to the Contractor.
- F. Mock-Ups/Sample Panels: Upon approval of all materials, the Contractor shall construct sample panels on site in the minimum size indicated below. Each sample panel shall be large enough to display typical characteristics of each item and type of work. Construct Sample panels concurrently to aid in review of all materials. The Commissioner must approve the visual characteristics, quality of workmanship, and methods of installation before final work is started. If the original sample is not approved, the Contractor shall provide additional samples, as required, at no cost to the City of New York until an approved sample is obtained. The approved sample shall become the standard for the entire job. Sample panel shall not be constructed on a location becoming part of the final work, unless otherwise noted, and shall remain undisturbed until all work is completed. Sample panels shall be constructed at the same time and erected in a location approved by the Commissioner and Construction Manager. Contractor shall completely remove any panels not set in place as part of the final work from site upon final acceptance of work.
1. Paving pattern, square: unit pavers, independent sample, 6'x6' minimum panel showing portions of the pattern and intersections as determined by the Commissioner.
- G. Surplus Stock: Provide 10% of total material used to the City of New York as surplus stock for maintenance and repairs.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store and handle materials to prevent deterioration or damage.
1. Stone shall be carefully packed and loaded for shipment using reasonable care and customary precautions against damage in transit. Material, which may cause staining or discoloration shall not be used for blocking or packing.
 2. The stone shall be stacked on timber or platforms at least 4 inches above the ground. Care shall be taken to prevent staining or discoloration during storage.
 3. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between wood and finished surfaces of completely dry stone.

1.06 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.
- B. Weather Limitations for Mortar and Grout:
1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

SECTION 32 1400 - UNIT PAVING

PART 1 GENERAL

1.01 RELATED DOCUMENT

- A. The following documents apply to all required work for the Project: [1] the Contract Drawings, [2] the Specifications, [3] the General Conditions, [4] the Addendum and [5] the Contract [City of New York Standard Construction Contract].

1.02 SECTION INCLUDES

- A. Granite Setts set in Dry Pack setting beds.
- B. Granite Pavers set in Dry Pack setting beds.
- C. Granite curbs.
- D. Concrete pavers on pedestals.
- E. Aluminum edge restraints.

1.03 SUBMITTALS

- A. Product Data: For materials other than water and aggregates.
- B. Samples for unit pavers, joint materials, edge restraints, and stone curbs.
- C. Shop Drawings: All dimensions to be verified in field and incorporated into shop drawings prior to submittal. Prior to Commencement of work, submit shop drawings of the following:
 - 1. Provide pavement pattern layout and paver cutting chart
 - 2. Concrete base, where applicable, clearly indicating extents of the paving and locations of control and pour joints. Identify base and paving joint relationship.
- D. Manufacturer Warranty: Products shall be guaranteed against defects in materials and workmanship for specific periods of time listed below from the date of acceptance of the work by the Commissioner.
 - 1. Concrete Pavers: 3-year.
 - 2. Granite Setts / Granite Pavers / Granite Curbs: 1-year.
 - 3. Paver Pedestal System: 3-year.
 - 4. Aluminum Edge Restraints: 15-year.

1.04 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Materials and methods of construction shall comply with the following standards:
 - 1. ACI: American Concrete Institute.
 - 2. ANSI: American National Standards Institute.
 - 3. ASTM: American Society for Testing and Materials.
 - 4. BSI: Building Stone Institute.
 - 5. FS: Federal Specifications.

3.04 DISPOSAL OF EXCAVATED MATERIALS

- A. Dispose excavated materials off site in a manner that will not interfere with other construction activities. Keep construction site at all times clean and free of soil and other debris that could affect progress of other construction activities.

3.05 FOOTING REINFORCEMENT

- A. Fabrication in accordance with 032000 from approved shop drawings.

3.06 FOOTING BEARING STRATA

- A. Footing Bearing Stratum Criteria and Verification
1. Footings shall be founded on soil strata with bearing capacity indicated on Drawings. Footings shall not be excavated until test results by Commissioner's Geotechnical Engineer confirm allowable bearing values indicated on Drawings, but shall be excavated immediately thereafter.
 2. Each footing bearing strata must be inspected and be acceptable to the Commissioner's Geotechnical Engineer before placing concrete
 3. Footing excavations to acceptable bearing strata shall not be left exposed to weather for more than 48 hours before footing concrete is placed.
 4. At no time before or after footing concrete is placed shall the soil below the footing be allowed to freeze. Adequate freeze protection must be sufficient depth to provide adequate frost protection per the geotechnical engineering report.

3.07 FOOTING CORRECTIVE MEASURES

- A. If unforeseen field conditions require corrective installation methods, notify Commissioner immediately.
1. Where a change to the construction installation method result in an as-built footing in compliance with the Contract Documents, submit installation method for record.
 2. Where the as-built footing does not meet the design intent of the Contract Documents. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Commissioner.
- B. If footings are installed outside allowable tolerances, develop and provide corrective methods at no extra cost to the City of New York including calculations based on actual locations of footings, taking into account eccentricity between final centerline of footing and design location of column centerline. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Commissioner. Calculations shall be signed and sealed by a Professional Engineer licensed in New York.

END OF SECTION

PART 3 - EXECUTION

3.01 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

- A. Before installing footings adjacent to known existing utilities, notify utility Commissioner to ensure that protective work will be coordinated and performed by Contractor in accordance with requirements of the Commissioner of utility or building. If any existing service lines, utilities, and utility structures to remain in service are uncovered or encountered during work, protect the uncovered element from damage and provide support where necessary.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during footing excavation, immediately notify Commissioner, Design Professionals and utility owner. Cooperate with Commissioner and utility owner in keeping their respective services, utilities and facilities in operation. Repair damaged utilities to entire satisfaction of Commissioner and utility owner concerned.
- C. Do not interrupt existing utility service facilities occupied and used by Commissioner and others, except when permitted in writing by the Commissioner and then only after acceptable temporary utility services have been provided.
- D. Protect structures, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by footing operations.

3.02 GENERAL FOOTING EXCAVATION

- A. Tolerances: Plan location tolerance is 2% of footing dimension but no greater than 2 inches (50 mm), whichever is greater. If indicated tolerances are exceeded, see "Footing Corrective Measures" in Part 3.
- B. Forming Sides of Footings:
 - 1. Provide forms for footings and grade beams if soil or other conditions are such that earth trench forms are unsuitable.
 - 2. When trench forms are used, provide an additional 1" (25 mm) of concrete on each side of the minimum design profiles and dimensions indicated.
- C. Cleanup of Footing Bottom: Excavate bottom to a level plane. Remove loose materials or free water as determined by Commissioner's Geotechnical Engineer.
- D. Bottom of adjacent footings that are at different elevations should never result in an excavation slope between footings greater than 1.0 vertical to 1.0 horizontal unless otherwise noted in the drawings or geotechnical engineering report. If steeper slopes occur, the EOR should be notified before any concrete is placed.

3.03 ADDITIONAL EXCAVATION AND FOOTING DEPTH

- A. Do not excavate below elevations noted by Commissioner's Geotechnical Engineer without prior review by Commissioner's Geotechnical Engineer.
- B. Where Commissioner's Geotechnical Engineer determines that soil encountered at design bearing elevation is not capable of providing minimum design bearing capacity, perform additional excavation as recommended by Commissioner's Geotechnical Engineer.
- C. If obstructions are encountered that interfere with new construction, remove such existing elements or develop corrective methods. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Commissioner. Efforts shall be made to address obstructions at no additional cost to the City of New York.

- a) Inspection of Batch Plant: As required to ensure that concrete delivered to job complies with Specifications and design mix. Batch plant inspection shall be required once at start of job and thereafter if concrete falls below Specifications.
- b) Inspection of Reinforcement: Provide continuous visual inspection of site fabrication. Record the steel reinforcement bar sizes, grade, length, and number of bars.
- c) Inspection of Concrete and Reinforcement Placement: Provide continuous visual inspection of installation of reinforcement and concrete placement including verification of laitance removal at top of footings.
- d) Check ready mix delivery tickets for correct concrete mix design number. Record batch to placement time. Check slump, temperature, and batch to placement time for each set
- e) Slump Tests: ASTM C143. Make 1 test from each truck.
- f) Concrete Compressive Strength Tests: Testing agency will take a minimum of one sample set of concrete cylinders per 20 cubic yards of concrete. See Section 033000 for requirements. Cure cylinders to simulate same curing conditions as concrete in footings. Reports of cylinder tests shall state footing location(s), laboratory or site curing, compression strength, type of fracture, age at testing, concrete supplier, mix specification strength, any other pertinent information, test results, and conclusions.
- g) Additional Tests: Perform additional testing if, in the opinion of the Commissioner, concrete of poor quality has been placed based on cylinder strengths below Specification requirements or visual defects. Tests may be compression tests on cored cylinders, ASTM C42, and load tests as outlined in ACI 318, or as directed by the Commissioner. Complete continuous coring of footings will be required, at Contractor's expense, where verification of quality of concrete is not otherwise attainable.

1.09 QUALITY ASSURANCE BY CONTRACTOR

- A. The Contractor's Professional Surveyor shall have previous experience in laying out foundation locations to perform surveys, layouts, and measurements for footing work. Conduct layout work for each footing to lines and levels required before excavation, and actual measurements of each footing's horizontal location, top elevations, deviations from specified tolerances, and other required data.
- B. The Commissioner's Geotechnical Engineer shall review Contractor submittals and will provide comments. Commissioner's Geotechnical Engineer will evaluate bearing strata, observe work, and report findings in a timely manner.
- C. Commissioner's Testing Agency: Required as specified in DDC General Conditions, and herein.

1.10 PERMITS AND GUARANTEE

- A. Guarantee: Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the guarantee period.

PART 2 - PRODUCTS

2.01 CONCRETE

- A. See Section 033000 and additional requirements listed below.

2.02 REINFORCEMENT

- A. See Section 032000.

1.06 DELIVERY, STORAGE AND HANDLING

- A. In accordance with Section 032000 and 033000.

1.07 PROJECT SITE CONDITIONS

- A. Geotechnical Information: Contractor to examine site, records of test borings, soil samples, and Geotechnical Reports that are available from the Commissioner. Soil boring test results are provided by the Commissioner for information, and are not guaranteed to represent conditions that are present at footing locations. Soil boring test results are not intended as representations or warranties of the continuity of the reported conditions. It is expressly understood that the Commissioner will not be responsible for interpretation or conclusions drawn by Contractor from the Geotechnical Report. At no additional cost to the Commissioner, evaluate the available data and provide additional test borings and other investigations as necessary for installing footings.
- B. Site Survey: Survey of site, existing utilities, and existing construction available from the Commissioner represent conditions known to Commissioner. Other obstructions may be encountered.

1.08 QUALITY ASSURANCE BY COMMISSIONER'S TESTING AGENCY

- A. Source Quality Control
1. See Section 033000.
- B. FIELD QUALITY ASSURANCE
1. See 033000 for general requirements.
 2. Contractor's Responsibilities
 - a) Examine the areas and conditions under which footings are to be installed. Notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
 - b) Furnish complete sets of approved shop drawings and other submittals to Commissioner's Testing Agencies and Geotechnical Engineers.
 - c) Furnish notifications to Commissioner's Testing Agencies and Geotechnical Engineers, with at least 24 hour advance notice of start of pouring each footing.
 - d) Provide access for Commissioner's and Contractor's Testing Agencies and Geotechnical Engineers. Provide concrete materials for sampling and testing.
 - e) Furnish storage facilities for material samples, in accordance with ACI Standard Practice.
 - f) Provide additional inspection and testing resulting as a consequence of following:
 - i. Lack of adequate evidence that work is in compliance with this Specification
 - ii. Work performed with improper supervision
 - iii. Work performed without prior notice
 - iv. Work performed contrary to Drawings and Specifications.
 3. Commissioner's Geotechnical Engineer: Perform tests and inspections, as specified herein, evaluate test results, and review compliance of installed work with Contract Documents and prepare and submit reports.
 - a) Review Contractor's proposed footing installation methods, sequences, and procedures.
 - b) Verify bearing stratum and bearing capacity of each footing; verify levelness of footing end bearing surface.
 - c) Determine final bearing elevation at each footing location.
 - d) Observe, record, and report footing as-built plan location, , footing size and final elevations of bottom (where possible) and top of completed footings.
 - e) Coordinate with Commissioner's Testing Agency.
 4. Commissioner's Testing Agency: Conduct the following tests and inspections during construction and prepare and submit reports.

1.05

SUBMITTALS

- A. Required Submittals - Where the SUBMITTALS section of this Specification is in conflict with DDC General Conditions, the more stringent requirements for the Contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested.
- (1) Submittal Schedule
 - (2) Footing Construction Methods
 - (3) Installer Qualifications
 - (4) Shop drawings
 - (5) Construction Log
 - (6) Contractor's Survey Report
 - (7) Submittals required by Related Documents
 - (8) Mill Certificates
 - (9) Commissioner's Concrete Testing Agency Reports
 - (10) Product Data
1. **Submittal Schedule:** See Section 033000.
 2. **Footing Construction Methods:** Submit for record, footing construction procedures developed by the Footing Contractor.
 3. **Installer Qualifications:** Submit proof of qualifications as stated in Section 1.09 of this Specification.
 4. **Shop drawings in accordance with 032000 and 033000, and as noted.**
 - a) Concrete mix designs in accordance with Section 033000.
 - b) Footing reinforcement in accordance with Section 032000 and 033000.
 - c) Footing layout drawing showing the location of each footing (with respect to building gridlines), size and depth of footing, and top of footing elevation.
 5. **Construction Log:** Commissioner's Testing Agency shall document, sign, and submit for record, a record of each footing construction, including:
 - a) Footing designation, top and where possible bottom elevation, and size of footing.
 - b) Size, length, and location of installed reinforcement.
 - c) Deviation of centerline plan location.
 - d) Actual allowable soil bearing capacity
 - e) Inspection and testing
 - f) Method of concrete placement, time of beginning and ending concrete discharge for each truck, (including any delays in concreting and location of construction joints in shafts) and any deviation from planned construction methods.
 - g) Volume of concrete supplied to footing and ratio of actual volume to theoretical volume.
 6. **Contractor's Survey Report:** Submit for record plans signed and sealed by a professional surveyor licensed in New York, indicating as built plan locations of footing centerlines (with respect to building gridlines), top and where possible bottom elevations, and identifying deviations of footing centerlines from design plan locations. Footings that are outside of specified tolerances shall be specifically identified on the plan.
 7. **Submittals required by Related Documents.**
 8. **Mill Certificates:** Per Specification section 032000, submit for record certified reports for physical and chemical properties of following materials:
 - a) Reinforcement bars.
 9. **Commissioner's Concrete Testing Agency Reports:** Submit for record
 - a) Reports of field observations.
 - b) Reports of field quality control tests, as related to concrete and reinforcement.
 - c) Any deviations from the Drawings shall be immediately brought to the attention of the Commissioner.
 10. **Product Data:** Submit for record for each type of product identified in Part 2. Product Data shall be clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published installation instructions and ICC reports, where applicable, for products of each manufacturer specified in this section.

SECTION 31 6100 - FOOTINGS

PART 1 - GENERAL

1.01 GENERAL

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract.

1.02 SCOPE

- A. The work covered by this Section shall include all labor, material, equipment, permits, engineering and other services necessary for the fabrication and installation of footings and related work, complete, in accordance with the Drawings and as specified herein.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Submittals DDC General Conditions
- B. Quality Control DDC General Conditions
- C. Concrete Section 033000
- D. Concrete Reinforcement and Embedded Assemblies Section 032000
- E. Structural Steel Section 051200
- F. Thermal and Moisture Protection Division 7
- G. Approved Equals DDC General Conditions
- H. See Drawings for locations, sizes, top elevations, and details.

1.04 CODES AND STANDARDS

- A. Building Code: Footing work shall conform to the requirements of the Building Code identified on the structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.
- B. Standards:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Standard Specifications for Structural Concrete.
 - 3. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 4. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 5. American Concrete Institute "Manual of Concrete Practice", various committee reports as referenced herein.
 - 6. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein.
 - 7. AWS D1.4 - Structural Welding Code-Reinforcing Steel.

3.06 FIELD QUALITY CONTROL

- A. Excavation Support: Contractor's Engineer shall be responsible for installation, monitoring and protection of the all excavation support and bracing.
- B. Adjacent Building Monitoring: Contractor's surveyors shall be responsible of establishment and monitoring of all of the survey control points. Survey results shall be reported to the Commissioner within 24 hours following the survey.
- C. Vibration Monitoring: The Commissioner will monitor peak particle velocity levels inside the surrounding buildings, resulting from all excavation operations for the project.

3.07 CLEAN-UP

- A. All excess material shall be removed from site and legally disposed of.
- B. All lumber, forms and metal work shall be removed immediately after completion of local areas. The Contractor shall be responsible for removal of all debris produced by work to this section from the site.
- C. Sidewalk and streets adjoining the property shall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the work of this Section.

END OF SECTION

- A. The work shall be executed so that no damage or injury will occur to the existing public and adjoining, adjacent structures, streets, paving, sewers, or utilities. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall, at own expense, repair such damage and shall assume all responsibility for such injury.
- B. Monuments, bench marks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced.
- C. The adjacent buildings are sensitive structures. The surrounding structures, streets, utilities shall be protected and monitored during the work described herein. Excavation work shall be restricted to hours indicated by City of New York.

3.05 MONITORING

- A. Monitoring of Excavation Support System: Install reference points at a maximum spacing of 25-ft on-center around the entire perimeter of the excavation to properly monitor the ground movements behind the excavation support system. As the excavation proceeds, install points on the excavation support system to measure potential lateral deflection. These locations shall be subject to review by the Commissioner. Reference points shall also be installed on all adjacent buildings, sidewalks and streets.
 - 1. The monitoring points shall be established by the Contractor employing a Professional Land Surveyor licensed in the State of New York, and referenced to a fixed off-site benchmark.
 - 2. Monitoring of the excavation support system, sidewalk, streets, and buildings shall be performed on a weekly basis during any sheeting, bracing, and excavation work. Readings shall be taken to nearest 0.005 ft. Written reports summarizing the monitoring results shall be submitted by the Contractor's Professional Engineer to the Construction Manager for review by the Commissioner.
- B. Monitoring of Adjacent Buildings: The Commissioner will conduct crack and vibration monitoring of the two adjacent buildings. The contractor will receive monitoring reports on a weekly basis and will be notified when threshold are exceeded. The Contractor shall monitor all adjacent building for movement as per 3.5A.
- C. Thresholds Limits:
 - 1. The maximum allowable vertical or lateral movement is 3/8 inches.
 - 2. The maximum allowable particle wave velocity is 0.5 inch per second.
- D. If the above thresholds are exceeded:
 - 1. The Contractor will immediately stop work in the vicinity of the exceedance.
 - 2. Inspect the adjacent building (or portions thereof) for potential damage. Inspections shall be made by the Contractor, his engineer, the Commissioner, and the adjacent building's engineers.
 - 3. Develop alternate methods and procedures, subject to the review and approval of the Commissioner and the adjacent building's engineers.
 - 4. Resume work using the agreed upon alternative method.
- E. The Contractor shall restore, to the satisfaction of City of New York, by repair or otherwise, the portions of buildings, or their contents, altered by the Contractor in furtherance of his sheeting, and work bracing. Restoration shall be completed to the conditions which existed prior to the start of work.

- D. All the above work shall be carried on in such a manner as not to interfere with the progress of the work under this Contract.
- E. Sheeting and bracing may be removed, left in place, or cut as approved by the Commissioner and as directed by the Construction Manager. Any material that affects finished construction shall be removed. Carefully remove materials such that no loss of support occurs beneath areas adjacent to the sheeting. Any material left in place must be removed not less than 4-ft below finish grade. Sheeting and bracing material removed from the excavation shall be immediately removed from the site and properly disposed of in accordance with all applicable State, City, and Federal Codes.
- F. Where sheeting and bracing is required to withstand earth pressures resulting from backfill placement, the backfill shall not be placed until after sheeting and bracing has been completely installed. Materials shall not be removed until the supporting structure has attained adequate strength.

3.03 SUPPORT OF EXCAVATION

- A. Temporary excavation walls shall be provided along the sides of excavations and any other material not self-supporting as defined by the plans or as designed by the Contractor's Professional Engineer.
- B. Excavation adjacent to the temporary wall shall not exceed a depth as specified by the Commissioner. Lateral support shall be installed and preloaded prior to continuing excavation.
- C. The Contractor shall submit to the Commissioner for review, a temporary excavation support system design prepared by a professional engineer licensed in the State of New York. The support system shall be designed to provide adequate protection for the adjacent structures, streets and utilities against any adverse effect of the excavation and construction. The Contractor shall obtain necessary Building Permits.
- D. Provide and install all support system components including H-piles, concrete piers, bracing, spurs, walers, rakers, anchors, beams, and other items needed to insure the proper installation of work and to protect adjacent structures, streets, paving, utilities etc.
- E. Sides of the site shall be protected against cave-in and movement of soil at all times.
- F. The above work shall be carried out in such a manner as not to interfere with the progress of the work under this Contract. If it is found necessary to pull H-piles, or change the position of the shoring, bracing, spurs, walers, rakers, beams, or other items in order to permit the construction work to proceed, the Contractor shall do this work at no extra charge.
- G. At the completion of the work, Contractor shall as required by the Commissioner remove all shoring, bracing, spurs, rakers, beams, and other items and remove same from the project premises.
- H. Where temporary bracing is required to withstand earth pressures, the backfill shall not be placed until after temporary bracing has been installed. If portions of the ground floor must be placed and have reached sufficient strength in order for the design of any portion of the foundation to withstand their required lateral load, backfilling shall not be placed until this work has been performed and the concrete reaches its necessary strength.
- I. The Contractor shall retain a professional engineer to provide controlled inspection of the temporary excavation support system work as required by the New York City Building Code.

3.04 PROTECTION OF ADJACENT STRUCTURES, STREETS AND UTILITIES

- A. Cement grout to be used for grouting the rock bolts and rock anchors shall be proportioned to satisfy the requirements of ACI Standard 318 for a minimum 28-day compressive strength of 4,000 psi.
- B. Cement used in grout mix shall be made from either Type I, II or III cement and shall conform to ASTM C-150. Water cement ratio shall be less than 0.45 by weight.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide, erect and maintain supports and around the foundation excavation areas. Locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces.
- B. Obtain all necessary permits to perform the work from the appropriate authorities and agencies prior to start of such work. Obey all applicable local and federal work safety rules and regulations.
- C. Install all necessary protection equipment, structures such as fences, signs, scaffolding etc. prior to start of work.
- D. Protect all utility lines, which are not to be abandoned. Contractor shall be responsible for any damage to them that may occur.
- E. Contractor shall examine and inspect adjacent structures, foundations, streets and utilities.
- F. Sheeting, bracing, supports, etc. shall be erected and maintained to the entire satisfaction of any City, State or local authorities having jurisdiction. Systems on which the support or stability of existing structures is dependant must be left in place at completion of work. In other areas, maintain system until structural elements are replaced by other bracing or until permanent construction is able to resist lateral earth, surcharge, and hydrostatic pressures.
- G. The construction and performance of the sheeting, supports, and bracing, etc. work for the purpose of which it is erected shall be the entire responsibility of the Contractor.
- H. Should any subsidence or any other damage occur due to the inefficiency of the work, the damage shall be made good by the Contractor at his own expense.
- I. The Contractor shall make use of such methods of work as are best adapted to preserve the safety and stability of foundations, walls, and other parts of affected buildings or structures.

3.02 SUPPORTS

- A. Supports shall be constructed in accordance with the New York City Building Code requirements.
- B. Install sheeting, bracing, supports, etc. to permit excavation to the required foundation subgrade as required to install the slabs and pits.
- C. During the excavation work specified in Section 31 00 00, if additional locations may require sheeting and/or supports based on the Contractor's construction methods and procedures, then the Contractor shall provide such additional supports at no additional cost to City of New York. Such additional supports shall be designed and constructed in accordance with the requirements of this Section, as per the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Provide suitable sheeting, bracing, beams, and other support materials which will withstand loads imposed without movement. Materials shall be kept in serviceable condition at all times.
- B. Steel shapes shall conform to ASTM Grade 50 having a yield strength of 50 ksi or greater. Rolled pipe shall conform to ASTM A-252 with a minimum yield strength of 35 ksi. Permanent soldier piles shall be epoxy coated.
- C. Concrete shall have a minimum f_c' of 4,000 psi.
- D. Lagging or other lumber shall be construction grade, rough cut full size, any species with a minimum allowable bending stress of 1950 psi.
- E. Pre-cast lagging, used in the permanent condition shall be installed in accordance with the manufacturers specifications.

2.02 PRESTRESSED ANCHORS

- A. Prestressed anchors shall be threadbars manufactured by Dywidag Systems International, Inc., SAS Stressteel Bar, Inc., and Williams Form Engineering or approved equivalent. The threadbars shall conform to ASTM A 722 Grade 150.
- B. Up to one couple shall be permitted. Anchors shall be uninked and free of nicks or injurious defects that interrupt the continuity of the corrosion protection materials and the steel bar encased within it.
- C. The anchors shall be furnished complete with all components and accessories, including but not limited to double corrosion protected threadbars, bearing plates, washers, gaskets, nuts, steel tubes, grout sleeves, grout pipes, smooth and corrugated sheaths and mastic corrosion inhibitor.
- D. Bearing plates, and washers shall conform to ASTM A 36.
- E. Nuts shall be hexagonal head, heavy-duty type conforming to ASTM A 325.
- F. The Contractor shall furnish certified copies of mill reports for each test and copies of certificates for each lot showing the nominal size, area, weight per linear foot, Guaranteed Ultimate Tensile Strength (GUTS), yield strength, modulus of elasticity, total elongation and other physical properties of the threadbar material required for the design, inspection and installation of the anchors. Elongation tests shall be specified in ASTM Designation A421 and A416. Mill reports, certificate and test results shall be submitted to the Commissioner not less than 7 days prior to installation.
- G. Centralizers shall be PVC and shall be adequate size to fit the drill hole.
- H. Accessories shall be in accordance with the manufacturer's recommendations.
- I. Bond length, free stressing length, size of bar, design and prestressing loads are defined on the plans. For alternate designs, submitted data for review shall be from the Contractor's professional engineer responsible for excavation support.

2.03 GROUT

- E. Procedures and methods to be used to ensure safety and stability of all adjacent structures.

1.06 QUALITY ASSURANCE

- A. Contractor Qualifications: The Contractor performing the work of this Section shall demonstrate that they have at least 3 years of recent field experience on projects of similar size, scope, and complexity.
- B. Special Inspections:
 - 1. Before commencing work of this Section, meet with representatives of the governing authorities, Construction Manager, City of New York, Commissioner, and other concerned entities. Review the sheeting and bracing procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.
- C. Monitoring of Excavation Support System: Engage and assign survey and monitoring work of this Section to a Professional Land Surveyor licensed in the State of New York. The results of all monitoring work of this Section shall be made immediately available to the Contractor's Professional Engineer responsible for the design supervision of the work specified herein and to City of New York, Construction Manager, Commissioner.
- D. Monitoring of Adjacent Structures: The Contractor shall perform his own monitoring and shall submit his monitoring results for comparison. Adjacent buildings shall be monitored by the Contractor at least bi-weekly for vertical and horizontal movements during all work, until permanent walls and below grade slabs are installed.
- E. Codes and Permits:
 - 1. Comply with the New York City Building Code, and any other Federal, State, or Local codes and ordinances having jurisdiction.
 - 2. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided without additional cost to Commissioner.
 - 3. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section.

1.07 PROTECTION

- A. The project site is an urban area. The adjacent buildings are sensitive structures. The work shall be executed so that no damage or injury will occur to the existing public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric or any other pipes. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall, at own expense, repair such damage and shall assume all responsibility for such injury.
- B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines and telecommunication lines) to remain in use within and adjacent to the area affected by the work of this project.
- C. Monuments, bench marks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced at no cost to the Commissioner.

- D. The Geotechnical Engineering Study prepared for City of New York Department of Design and Construction by Louis Berger and Associates, P.C., dated January 2009.

1.04 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Project Specifications
1. Section 03 30 00 – Cast-in-Place Concrete
 2. Section 31 00 00 – Earthwork

1.05 SUBMITTALS

- A. Unless otherwise indicated, transmit all submittals to the Construction Manager for review by the Commissioner before proceeding with ordering, fabricating, or any other work of this Section. Submittal review will be of the concept only and shall not in any way diminish or limit the Contractor's responsibility for the design, performance, and quality of the work of this Section and for the protection of existing structures.
- B. Submit qualification data for firms specified herein, to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, and names of Architects and Owners.
- C. Design Plans and Shop Drawings: The Contractor's Engineer shall submit design plans and shop drawings of all items in this Section, in accordance with the Contract Documents at least 15 work days before beginning work. The design plans and shop drawings shall be submitted signed and sealed by Professional Engineer licensed in the State of New York engaged by the Contractor. Contractor shall obtain DOB approval of alternate plans.
1. Provide calculations, design plans, and shop drawings that show the limits and layout of the excavation support system. Provide representative sections for each side of the excavation that include calculations, structural details, embedment depth, and bracing elements. Provide elevations that give the location and identification of all lateral bracing elements. Provide a schedule that gives design load in each brace, proof test load, and lock-off load, etc.
 - a. Excavation side stabilization plan, details and calculations including but not limited to sheeting, bracing and anchoring.
 - b. Adjacent property and structures protection and monitoring plan. Show in a detailed and scaled plan locations of survey control point locations.
 - c. Detailed anchor layout and identification plan, if required.
 - d. Submit results of all tests including applied load charts no later than 24 hours after each test. Submittal shall be signed and sealed by a Professional Engineer licensed in the State of New York.
 - e. Submit original manufacturer's certificates for all materials as specified herein.
- D. Certification for Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports by the subsoil exploration consultant, the Drawings, and all other Contract Documents.

SECTION 31 5000 - EXCAVATION SUPPORT AND MONITORING

PART 1 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.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the design and installation of excavation support, protection and monitoring of the adjacent structures as shown on the contract documents and specified herein including, but not limited to the following:
 - 1. Design and installation of shoring, bracing, or anchoring of all excavation sides, including support of the secant walls as required, to prevent any damage to adjacent structures, buildings, walls, street paving, utilities adjacent to new construction and in the vicinity of the new construction.
 - 2. Drill in all soldier piles. Driven soldier piles shall not be allowed.
 - 3. Review drawings of adjacent buildings.
 - 4. Protection and monitoring of adjacent buildings, streets and utilities.
 - 5. Other labor and materials as may be reasonably inferred to be required to make the work under this Section complete.
 - 6. Removal of sheeting and bracing, as required.
- B. Definitions
 - 1. Temporary Support System: Support system utilized to support earth excavation sides. Support system includes but not limited to struts, rakers, walers, anchors, soldier piles, beams, concrete piers, rakers, lagging, etc.

1.03 REFERENCES

- A. Latest revision of the following standard specifications, where not otherwise required by the Contract Documents:
 - 1. ASTM A36 Standard Specification for Carbon Structural Steel.
 - 2. ASTM A252 Welded and Seamless Steel Pile Piles.
 - 3. ASTM A416 Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
 - 4. ASTM A572 Structural Steel of High-Resistance and Low-Alloy of Columbium and Vanadium, with 50 ksi minimum yield point and a 65 ksi minimum tensile strength.
 - 5. ASTM A722 Standard Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete.
- B. Post Tensioning Institute (PTI) Manual - "Recommendations for Pre-Stressed Rock and Soil Anchors, latest edition.
- C. New York City Building Code.

- G. The entrance shall be maintained in a condition which will prevent tracking of sediment onto public-right-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public right-of-way must be removed immediately.
- H. When necessary, wheels must be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment trapping device. All sediment shall be prevented from entering storm drains, ditches and watercourses.

3.04 INSTALLATION AND MAINTENANCE, SEEDING

- A. Temporary seeding must be used on areas which will be exposed for more than 14 days.
- B. Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.
- C. Mulch the area with hay or straw at 2 tones/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other spray able products approved for erosion control (nylon web or mesh) may be used if applied according to manufactures' specification.

3.05 INLET PROTECTION SILT SACK - INSTALLATION AND MAINTANANCE

- A. Silt sacks shall be installed prior to start of construction activity on site and shall not be removed until final acceptance of work, unless otherwise directed by the Commissioner. The Contractor shall remove the grate of the catch basin and install the sack in accordance with the Manufacturer's written instruction. The grate shall be set back into place after the sack is installed with the lifting straps outside or on top of the grate.
- B. The contractor shall remove all accumulated sediment and debris from the vicinity of the catch basin after each storm event and as directed by the Commissioner. Where the sack is more than one-third (1/3) full of sediment, the sack shall be cleaned by lifting the unit out of the catch basin and emptying the contents to an area within the contract limit line as directed by the Commissioner.
- C. The silt sack shall be maintained in working condition for the life of the project. If the sack breaks, is damaged or ceases to function during the construction period, the Contractor shall remove and replace it with a new one at no additional cost.

END OF SECTION

- F. All erosion and sediment controls shall remain in place until the tributary area to the control is completely stabilized. All controls shall be checked daily and after storm events to ensure they are in proper working order.
- G. The Contractor shall replace at no extra payment any control device that is not functioning properly as directed by contracting officer or authorized regulatory personnel.
- H. The Contractor shall implement dust control measures during construction. Contractor to minimize dust clouds by watering down construction area or other approved methods as required.
- I. Inlet protection shall be installed on all new catch basins immediately upon construction.
- J. All construction vehicles hauling materials either into or out of the construction area shall have a secured tarp over materials to prevent sediment pollution of public roadways.
- K. Contractor shall provide a rock construction entrance and construction vehicle wash down area at all egress points from un-stabilized areas to prevent tracking mud onto public sidewalks and roadways.
- L. Any storm water that must be disposed of off-site shall be discharged to a combined sewer with a NYCDEP permit (Contractor to obtain permit). Contractor is prohibited from discharging dewatering devices to city sewers without prior NYCDEP approval.
- M. Contractor shall field verify quantity of all drains and install protection for each.

3.02 PROTECTION AND REMOVALS

- A. Maintain erosion and sediment controls in good working order, using best management practices.
- B. Soil sediment removed from any temporary control measure during regular protection shall be treated as site earthwork and returned to site or disposed of per Contract Documents.
- C. Erosion and sediment controls shall not be removed until the site has been adequately stabilized, or as otherwise directed by the Commissioner.
- D. Stabilization shall be defined as a uniform, 80% vegetative cover for landscaped areas. Stabilization shall be defined as installation of stone subbase in pavement and slab areas.

3.03 STABILIZED CONSTRUCTION ACCESS - INSTALLATION AND PROTECTION

- A. Install stabilized construction entrances at any point where traffic will be entering or leaving a construction site to or from a public-right-of-way, street, alley, sidewalk, or parking area.
- B. Stabilized construction entrance stone thickness shall be a minimum of 6 inches.
- C. The stabilized construction access shall be twelve feet minimum but not less than the full width of points of where ingress or egress occurs. The stabilized construction access shall be a minimum of 24-inches if there is only one entrance to the site.
- D. The length of the stabilized construction access shall be 50-feet minimum.
- E. Geotextile shall be placed over the entire area to be covered with aggregate.
- F. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

- G. Fibrous blankets by North American Green SC150BN, biodegradable
- H. Temporary mulches such as loose hay, straw, netting, wood cellulose or agricultural silage
- I. Filter Stone: use Drainage Fill material as defined in Section 310000.
- J. Temporary Stockpile: PVC sheeting shall be a minimum of 10 mils thick.
- K. Stabilized Construction Access
 - 1. Stone aggregate: use Broken Stone Ballast as defined in Section 310000.
 - 2. Geotextile: woven or non-woven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydrocarbons, mildew, rot resistant, and conform to the fabric properties shown:

PROPERTY	UNIT	TEST METHOD	Light duty* Roads Grade Subgrade	Heavy duty** Haut Roads Rough Graded
Grab Tensile Strength	lbs.	ASTM D1682	200	220
Elongation at Failure	%	ASTM D1682	50	60
Puncture Strength	lbs.	ASTM D751	40	125
Mullen Burst Strength	PSI	ASTM D3786	190	430
Equivalent Opening Size		US Std. Sieve CW-02215	40-80	40-80
Aggregate Depth	[inches]	-	6	10

- a. Light duty roads: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trivera Spunbound 1115, Mirafi 100X, Typar 3401, or equivalent.
- b. Heavy duty roads: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbound 1135, Mirafi 600X or equivalent.

PART 3 EXECUTION

3.01 PRERARATION

- A. Review site conditions with Commissioner and Contract Drawings prior to the commencement of earth moving activities/excavation.
- B. Notify the Construction Manager and Commissioner prior to the commencement of Work. Any proposed deviations from the specifications must be submitted to the Commissioner in writing 72 hours prior to commencing work.
- C. By beginning Work, the Contractor has deemed the site conditions are accepted and any corrections to encountered unsatisfactory conditions will occur at no additional cost to the City of New York.
- D. All erosion and sediment controls shall be installed prior to land disturbing activities or as necessary to control erosion from land disturbing activities. Comply with all applicable standards for Soil Erosion and Sediment Control in New York State.
- E. The Contractor will be responsible for the proper construction, stabilization, and protection of all temporary and permanent erosion and sedimentation control measures and related items.

- C. Report all materials, seed mixtures (if applicable), and hydroseed mixtures (if applicable) with rates of application and dates.

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt Fence

1. Silt fence posts: shall be wood, steel, or an approved synthetic material, with a minimum length of three feet. Hardwood posts shall have a minimum cross sectional area of three square inches and steel posts of standard T and U sections weighing not less than 1.00 pounds per linear foot.
2. Silt fence fabric: the fabric shall meet or exceed the following specifications:

PROPERTY	UNIT	TEST METHOD	MIN. ACCEPTABLE VALUES
Grab Tensile Strength	lbs.	ASTM D1682	90
Elongation at Failure	%	ASTM D1682	50
Puncture Strength	lbs.	ASTM D751	40
Mullen Burst Strength	PSI	ASTM D 3786	190
Slurry flow rate	(gal./min.sf)		0.3
Equivalent Opening Size		US Std. Sieve CW-02215	40-80
Ultraviolet Radiation Stability	%	ASTM G-26	90

3. Wire Fence: Minimum 14 ga. with a maximum six inch mesh opening
 4. Prefabricated silt fence units: Mutual MISF 1776, Mirafi 100X, Stablenka T140N or approved equal
 5. Non-woven filter fabric fence - Mirafi 100x or approved equivalent
- B. Catch basin and trench drain erosion control details - as shown on contract documents
- C. Filter Fabric Inlet Protection
1. The silt sack shall be an open-top geotextile bag that can be suspended from a catch basin grate. The suspended solids are allowed to settle out of the slowed flow and are captured by the sack prior to entering the inlet. There shall be two dump straps attached at the bottom of the sack to facilitate the emptying and cleaning of the sack and there shall be two lifting hoops as an integral part of the system to be used to lift the sack from the catch basin.
 2. The geotextile sack shall be constructed with high-tenacity, monofilament, polypropylene yarns which are woven into a stable network such that the yarns retain their relative position. The geotextile shall be resistant to ultraviolet degradation and to biological and chemical environments normally found in soils. Acceptable materials are "Dandy Sack™" Mirafi, "Silt Sack" The BMP Store or "StormSok" Fabco or equivalent Orange Construction Fencing or approved equal (placement location to be coordinated with the Commissioner)
- D. Quick growing grasses such as wheat, rye or oats
- E. Hay or straw bales
- F. Bale stakes (shall be a minimum of 4 feet in length and 1" in width)

- B. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- C. Project Specifications:
 - 1. Section 020110 - Protection of Existing Conditions
 - 2. Section 021000 - Protection of Existing Utilities
 - 3. Section 310000 - Earthwork

1.07 REFERENCE STANDARDS

- A. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. The latest edition, as of the date of the executed construction contract, of referenced standards listed below applies to this contract.
 - 1. EPA Standard 832/R-92-005, Chapter 3- Sediment and Erosion Control
 - 2. NYSDEC Standards and Specifications for Erosion and Sediment Control latest revision
 - 3. New York City Building Code, latest edition.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. The Contractor shall protect adjacent properties and waterways from erosion and sediment damage throughout construction in accordance with NYC Department of Environmental Protection and NYSDEC.
- B. Discharge from dewatering operations shall not be directed to public sewers without prior approval from the NYC DEP.

1.09 QUALITY ASSURANCE

- A. Perform work specified herein and shown on the Contract Drawings in compliance with applicable requirements of the New York City Building Code and requirements of all state and local authorities, and utility companies having jurisdiction.

1.10 EXTRA MATERIALS

- A. Extra materials should be kept on site at all times. Should any erosion and sediment controls be deemed deficient, the contractor must repair and/or replace immediately.

1.11 SUBMITTALS

- A. Materials sourcing and reporting - Submit a materials report, including the names of suppliers and material costs.
- B. Materials shall be provided from the same source throughout the Work. Change of source requires approval from the Commissioner.

SECTION 31 2500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Work of this section, as shown or specified, shall provide erosion and sedimentation controls in accordance with the requirements of the Contract Documents. The Contractor must accept the site as-is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.

1.02 WORK INCLUDED

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, permitting costs, certificate costs, services, filing fees, testing costs, security, insurance and all other associated or related items specified herein that are necessary and are required to complete the Work. Work shall include:
 - 1. Installing and maintaining temporary and permanent erosion control systems.
 - 2. Removal and proper disposal of temporary erosion control systems when work is complete and tributary area is stabilized.

1.03 CONTRACTOR RESPONSIBILITIES

- A. Contractor is responsible for coordinating this work with other trades on-site.
- B. All work to be performed in accordance with the latest New York State Department of Environmental Conservation standards and specifications for erosion and sedimentation control and meet EPA 832 regulations

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle materials as recommended by the manufacturer to protect from damage.

1.05 PERMITS AND APPROVALS

- A. Contractor shall prepare and obtain all required permits prior to construction unless otherwise directed by Commissioner. Copies of all permits shall be supplied to the Commissioner prior to the commencement of work authorized by the permit.

1.06 RELATED SECTIONS AND DOCUMENTS

- A. Erosion and Sediment Control measures shall comply with the requirements of the Erosion and Sedimentation Control Plan and details. Additional control measures are described on Contract Drawings

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- C. Sidewalk and streets adjoining the property shall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the work of this Section.

END OF SECTION

obtained from the Commissioner. If fill is required on both sides of a wall, it shall be brought up simultaneously and evenly on both sides.

- M. The Contractor shall do all filling necessary to bring the ground surfaces to the required levels for floors, pits, and areaways as shown on the drawings.
- N. Any surplus materials shall be removed from site and legally disposed of. Should additional material be required for the placing of backfill, other than material obtained from the site, the Contractor shall obtain, and deliver and place accepted backfill material as required.

3.08 FIELD QUALITY CONTROL

- A. The Commissioner will employ, at his own expense, a Geotechnical Engineer to review all laboratory test results and submitted reports specified in this Section.
- B. The Commissioner will interpret the tests, state in each report whether or not the test specimens and results comply with all requirements of the Contract Documents and note any deviations.
- C. The Commissioner's Special Inspection Engineer will identify when and where samples are to be obtained for testing.
- D. The Contractor shall collect samples and forward them to the Commissioner's Testing Laboratory. Testing Laboratory will submit the following laboratory test reports to the Commissioner.
 - 1. Laboratory results conducted on each type of borrow and fill material:
 - a. Gradation Analysis - ASTM D 422.
 - b. Atterberg Limits - ASTM D 4318.
 - c. Modified Moisture Density Curve Determination - ASTM D 1557.
 - 2. Owner's Special Inspection Engineer will review for conformance of materials to be used for fills, based on the gradations given in these specifications.
- E. Field Inspection:
 - 1. All field inspections shall comply with the requirements of the New York City Building Code.
 - 2. Building Slab Subgrades: Commissioner's Engineer for Special Inspection shall inspect subgrades for all building slabs and footing elements. No pavement, slab, or footing shall be constructed unless the subgrade is approved by the Commissioner's Engineer for Special Inspection.
 - 3. Proof-rolling: Proof-rolling operations shall be inspected by Commissioner's Engineer for Special Inspection.
 - 4. Backfilling and Compaction: The Commissioner shall hire a testing agency to verify the densities of the fill placed. The testing agency shall take field density tests of the fill placed and shall report to the Commissioner. No fill shall be placed without inspection and approval of the Commissioner's testing agency. The testing agency will take field tests (in accordance with ASTM D 2922) of the subgrade for every 2,500 sq-ft, but not less than 3 tests per lift in each area, and a minimum of three tests for every compacted soil lift behind foundation walls.

3.09 CLEAN-UP

- A. All excess material including, earth, rock, fill, shall be removed from site and legally disposed of.
- B. All lumber, forms and metal work shall be removed immediately after completion of local areas. The Contractor shall be responsible for removal of all debris produced by work to this section from the site.

- D. **Placing:** Place fill in horizontal 12-inch-thick maximum loose layers to produce a uniform thickness of material. Start placement in the deepest area and progress approximately parallel to the finished grade. Do not place fill where free water is standing, on frozen subsoil or surfaces that have not been approved.
- E. **Compacting:** Compact each layer of fill with appropriate equipment listed below in this Article to achieve as a minimum the following percentages of maximum density at optimum moisture when tested in accordance with ASTM D1557:

LOCATION	% MAX. DENSITY
Under Building Slab-on-Grade	95
Under Paved Areas	95
Under Structural Members and Structural Slabs	92
Behind Foundation Walls	95

- F. **Under Pile Supported Building Slabs and Utilities -** Compact each 12-inch-thick lift of the general fill with a minimum 6 overlapping passes with a 10 ton vibratory roller compactor in open areas. Use a 1 ton walk behind roller compactor to the extent possible in areas that preclude access by a 10 ton compactor. Use a plate tamper in and around penetrations, small restrictive areas, or any other areas not accessible to the 1-ton roller compactor.
- G. **Compaction Equipment:** Granular fills (sand, gravel, friable earth) shall be compacted with a vibratory plate compactor not less than 0.5 ton in static weight to the extent possible. A jumping jack shall be used in and around penetrations, small restrictive areas, or any other areas not accessible to the roller or heavy plate compactor.
- H. **Backfilling against Foundation Walls:** After completion of foundation walls and removal of forms, clean the excavation of all trash and debris before application of waterproofing and/or vapor barrier and placement of backfill.
- I. Do not backfill against foundation or basement walls until completion of supporting floor construction to top of backfill or to first level above top of backfill, unless adequate temporary shoring is provided.
- J. If Contractor elects to backfill against foundation or basement walls prior to completion of supporting floor slabs, these walls shall be shored. Temporary shoring shall be designed by a professional engineer retained by the Contractor. Shoring design and calculations shall be submitted to the Commissioner for their review and approval.
- K. In placing backfill, take special care to prevent wedge action, eccentric loading or overloading of the structure by equipment used for compacting backfill material, and to prevent damage to waterproofing on walls. Where subsoil drainage systems are installed, place backfill to prevent any damage to the systems. Any damage to waterproofing or drainage systems caused by backfilling or excavation operations shall be corrected or replaced by the Contractor at his own expense.
- L. Additional backfilling required to bring fill to the finished subgrades shown, shall be done by the Contractor only after the concrete walls or footings, against which the backfilling is done, have attained their full design strength, have been braced and the written permission to backfill is

3. Trenches shall be by open cut from the surface. No tunneling shall be allowed except by consent of the Geotechnical Consultant. Irregularities at bottom of trench, or where excavation is below required depth, shall be refilled to required grade with compacted controlled fill or gravel.
4. Pipe trenches shall be excavated and minimum cover shall be provided to required depths as per the New York City Building Code.
5. Where trench subgrades are wet or such that in the opinion of the Commissioner's Inspection Engineer is unsuitable for supporting the piping, subgrade shall be improved as directed by the Commissioner's Special Inspection Engineer. The improvement shall include removal of unsuitable material and placement of controlled fill and construction of concrete cradles or approved equivalent as directed by the Commissioner.
6. Where necessary, the sides of trenches and excavations shall be supported by adequate sheeting and bracing to ensure proper construction and safety of the workers. The Contractor will be held responsible for the sufficiency of sheeting and bracing and for all damages to property or injury to persons resulting from improper quality, strength, placing, maintaining and removing of same.
7. Immediately after piping has been installed, tested, inspected, and accepted, piping shall be filled around with special care to solidly fill voids without causing injury to piping. Piping trenches shall be backfilled using approved controlled fill. Up to 2 ft above pipe, 4-inch thick layers shall be hand filled. For remainder of trench, 12-inch thick layers shall be filled in. Each layer shall be compacted in accordance with the requirements given in sections below before placing next layer. No pieces larger than 2 inches in any dimension shall be allowed in fill up to 2 ft above pipe and no pieces larger than 4 inches in any dimension shall be allowed in fill above.
8. Existing utility lines to be retained that are shown on the drawings or the locations of which are made known to the Contractor prior to excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor.
9. As backfilling proceeds, all sheeting and shoring shall be removed in such a manner as to prevent the sides of the excavation from caving in or cracking. No backfilling of utility lines shall be done until all testing and inspection of the system or portion of the system has been completed and accepted.

3.06 PROOFROLLING

- A. Prior to backfilling, all excavations should be proof-rolled using a minimum 3-ton roller. Any loose areas identified by proof-rolling should be removed and replaced with controlled fill in accordance with Section 3.7.

3.07 FILLING, GRADING AND COMPACTING

- A. Filling and backfilling shall not be performed until work has been inspected by City of NY. All wood, paper and other deleterious materials shall be cleaned out from excavations before backfilling for special inspection.
- B. The filling or backfilling within the area of the building shall be done so that there will be no void spaces below floors and bottoms of pits and trenches, unless otherwise noted.
- C. General: Material for fill and backfill shall be Controlled Fill as herein specified under Part 2 of these specifications. Material may be obtained from borrow sources and shall be free of any contamination.

3. Excavation shall be to required elevations for bottom of pile caps, footings, floors pits, slabs, walls, etc. Excavation shall be made to a depth that will allow installation of full depth of concrete slabs, sub-base, and waterproofing as shown on drawings with a 1 inch tolerance. Excavation lines shall provide sufficient clearance for the proper execution of all concrete work including allowances for form work, shoring and inspection.
 4. A 3-inch-thick concrete mud-slab shall be required on all surfaces that will require horizontal waterproofing. All vertical surfaces to receive "blind-side" waterproofing shall require a flat/rigid substrate.
 5. Materials that, in the opinion of the Commissioner, are not suitable for fill, any surplus earth and all rock, shall be removed from the site and legally disposed of.
 6. The bottom of excavations shall be leveled off and graded to receive foundations, slabs, pits, trenches and grade beams.
- B. Excavation for Footings
1. Footing subgrades shall be approved by the Commissioner for Special Inspection before proceeding with the formwork, rebar, or concrete placement. Bottoms of footings shall be founded on materials suitable for achieving the bearing pressures indicated on Contract Drawings and as approved by the Commissioner for Special Inspection.
 2. Subgrade Bearing Capacity: The subgrade shall be New York City Building Code Class 3 or better and shall have an allowable bearing capacity of at least 3 tons per square foot unless specified otherwise.
 3. Subgrade of footings shall be level and free of loose rock, dirt, debris, standing water and frost before acceptance for placing concrete.
 4. Unauthorized Excavation: When suitable bearing material is encountered at subgrade elevations shown and excavation is made to a greater depth, the footings and foundation walls shall be extended to the lower elevation with concrete of the same strength used for the footing, at no additional cost to the Commissioner.
 5. Authorized Additional Excavation: When unsuitable bearing material is encountered at subgrade elevations shown, the Commissioner for Special Inspection may require removal of unsuitable material and extension of footings and foundation walls.
- C. Excavation for Building Slabs and Structural Members
1. Subgrades of building slabs and structural members including framed slabs and grade beams shall be approved by the Commissioner before proceeding with their construction. Subgrades shall consist of material that meets the bearing capacity requirements given in the Contract Documents. Subgrades resulting from excavation shall be free of unsuitable material (fill, loose rock pieces, organics, debris, etc.) as judged by the Commissioner.
 2. Where required, waterproofing shall be installed in accordance with the Contract Drawings and Section 07 13 26.
 3. Unauthorized Excavation: Excavations performed below the elevations shown or specified, shall be filled and compacted as hereinafter specified, at no additional cost.
 4. Authorized Additional Excavation: Where the Commissioner's Special Inspection Engineer determines that the bearing material encountered is unsuitable, remove the unsuitable bearing material. The removed material shall be replaced with controlled fill or concrete as directed by the Commissioner.
- D. Trench Excavation
1. Excavation for Utilities, Drainage Piping, Within and Outside the Building Limits (trenches).
 2. Trenches for underground conduit, piping, drainage piping, where necessary, shall be excavated to the required depth and bell holes shall be provided where necessary to ensure uniform bearing. Trench excavation lines shall provide sufficient clearance for the proper execution of underground mechanical work.

3.04 PUMPING AND DEWATERING (IF REQUIRED)

- A. The Contractor shall assume the responsibility for site drainage upon entering the premises and shall maintain such drainage during the life of his contract, meeting all applicable regulations and permits, and so as not to adversely affect the adjacent areas.
- B. The Contractor shall install monitoring wells to determine the groundwater draw-down outside of the excavation (a minimum of 2 wells in each of the sidewalks fronting the site).
- C. The groundwater shall be maintained at least 2 ft below the subgrade level until the cellar slab is cast and the foundation walls are cast to street level grade. Contractor may only cease dewatering operations upon approval of the Commissioner.
- D. The drawdown outside the site shall be limited to 2 ft from static level.
- E. The Contractor shall, during the progress of his work, provide and maintain all required pumps, wells, suction and discharge lines, power, etc. in sufficient number, capacity, and configurations to keep all excavation, pits, trenches, footings, foundations, and the entire property area free from accumulation of water at all times and under any and all circumstances and contingencies that may arise.
- F. The methods of dewatering shall be at the option of the Contractor, provided that dewatering be accomplished in a manner that will preserve the strength of foundation strata, will not cause instability of the excavation sides, will not result in movement of excavation faces or loss of ground from beyond the property lines, and will not cause damage to existing structures, streets, pavements, and utilities.
- G. The Contractor shall be responsible for obtaining all necessary permits to continuously discharge pumped water so as not to impede this or any other work.
- H. Any dewatering method selected by the Contractor or which, after installation and while in operation, causes or threatens to cause damage to adjacent property shall be modified by the Contractor at no expense to the Commissioner.
- I. The Contractor shall be responsible for all remedial action and associated costs due to problems arising from improper control of surface water and groundwater.
- J. The Contractor shall not use any portion of the building foundation units or any part thereof as a sump for drainage resulting from pumping in any other area. The Contractor shall not conduct water to privately owned properties.
- K. The Contractor shall comply with all NYCDEP requirements if dewatering into the municipal sewer system.

3.05 EXCAVATION

- A. General
 - 1. The excavation shall be unclassified and shall comprise and include the satisfactory removal and legal disposal of all materials encountered regardless of the nature of the materials and shall be understood to include boulders, earth, hardpan, miscellaneous fill, foundations, demolition debris from on-site buildings, structures, slabs, walls, utilities, pavements, curbs, piping and debris.
 - 2. All excavation shall extend to the depths of the form and size required for the installation of the work as indicated on the drawings.

- B. Before bringing any fill to the site, the Contractor shall submit the source for approval by the Commissioner, in accordance with Section 1.5 of this specification.
- C. All fill materials required shall be free from wood, debris, combustible materials, vegetable matter or any material subject to decay or disintegration. Fill material shall not be contaminated.

PART 3 EXECUTION

3.01 PREPARATION OF PROJECT SITE

- A. Obtain all necessary permits to perform the work from the appropriate authorities and agencies prior to start of such work. Obey all applicable local and federal work safety rules and regulations.
- B. Install all necessary protection equipment, structures such as fences, signs, scaffolding, etc. prior to start of work.
- C. Contractor shall coordinate with ownership in order to access adjacent cellar levels to confirm slab elevations.
- D. Remove all existing structures, utilities, pavement in accordance with the Contract Documents.
- E. Set all lines, elevations, and grades for utility and drainage system work and maintain for the duration of work. Provide careful maintenance of benchmarks, property corners, monuments, or other reference points.
- F. Protect all utility lines, which are not to be abandoned. Contractor shall be responsible for any damage to utilities that may occur.
- G. Verify location, size, elevation, and other pertinent data required to make connections between existing utilities and drainage systems, and proposed construction indicated on Construction Drawings. Coordinate all building utility connection locations and elevations with plumbing, mechanical and architectural plans. Contractor shall comply with all local codes and regulations.
- H. Over excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas are to be stabilized by using acceptable backfill materials and/or additional bedding material placed and compacted as specified to the satisfaction of the Commissioner.

3.02 PROTECTION AND MONITORING OF ADJACENT STRUCTURES, STREETS AND UTILITIES

- A. The work shall be executed so that no damage or injury will occur to the existing public and adjoining or adjacent structures, streets, paving, sewers, or utilities. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall repair such damage and shall assume all responsibility for such injury. Refer to Specification Section 31 50 00 for monitoring requirements.

3.03 SITE DRAINAGE

- A. The Contractor shall assume the responsibility for site drainage and shall maintain such drainage during the life of this contract in a manner so as not to adversely affect adjacent areas and structures.

cinders, frozen material, trash, masonry or rubble and free of stones having a dimension greater than 3 in. The material shall have a maximum of 12 percent by dry weight passing the No. 200 sieve, as determined from the percent passing the No. 4 sieve.

2. **Structural Fill:** Clean sand or other porous material as accepted, containing not more than 10% by weight of materials finer than No. 200 mesh sieve and not more than 10% retained on a 3/4" sieve. Recycled Concrete Aggregate (RCA) and blasted/tunneled rock fragments, commonly known as "mole" rock shall not be permitted to be used.
3. **Drainage Fill Material:** Clean natural 3/4-inch crushed stone. The material shall be composed of crushed ledge rock (blue stone), roughly cubical or pyramidal in shape and of uniform quality. Recycled Concrete Aggregate (RCA) and "mole" rock shall not be permitted to be used as drainage Fill Material.
4. **Sand Bedding Material:** Natural or processed sand free from debris, clay lumps, organic, or other deleterious material; and complying with the following gradation requirements:

U.S. Sieve Size	Percent Passing (by weight)
3/4 Inch	100
No. 4	95-100
No. 16	45-85
No. 50	3-29
No. 100	0-10

5. **Stone Bedding Material:** free draining, natural crushed stone free of deleterious materials and conforming to the gradation requirements AASHTO 57 stone. The material shall be composed of crushed ledge rock (blue stone), roughly cubical or pyramidal in shape and of uniform quality and complying with the following gradation requirements:

U. S. Sieve Size	Percent Passing (by weight)
1-1/2 Inch	100
1 Inch	95-100
1/2 Inch	25-60
No. 4	0-10
No. 8	0-5

6. **Base material** shall consist of Size No. 3 broken stone and conform to NYCDOT Type 1, Grade B: Broken Stone, Moderately Resistant to Abrasion; or other approved granular material containing not more than five (5) percent material passing a No. 200 mesh sieve and not more than (5) percent retained on a 2" square sieve.
7. **Broken Stone Ballast:** Broken stone ballast, to be used to stabilize poor soils and construction entrance and roads, shall be composed of crushed ledge rock (blue stone), roughly cubical or pyramidal in shape, with a gradation conforming to ASTM C33 No. 1 stone. Material shall be uniform in quality and free of wood, loam, clay, dirt, roots, bark, and any other extraneous material.

Sieve Size	Percent Passing by Weight
2-1/2"	100
2"	90-100
1-1/2"	35-70
1"	0-15
1/2"	0-5

- D. Excavation sides of any pits within the site and adjacent structure foundations shall be protected by means of adequate bracing, shoring and anchoring at all times. Refer to all relevant specifications. No site excavation shall proceed until adequate support for excavation sides is provided. Contractor is solely responsible for the stability, safety and protection of excavation sides.
- E. The Contractor shall provide barricades, warning lights, and barriers to prevent accidents, and to prevent all hazards to protect the public and property at all times, including Saturdays, Sundays, and Holiday.

1.10 ERRORS IN DEPTH

- A. In the event that any part of the excavation is carried, through error, beyond the depth and the dimensions indicated on the drawings or called for in the specifications, then the Contractor, at his own expense, shall furnish and install gravel, stone, or structural concrete with which to fill to the required level at all locations, subject to approval of the Commissioner.

1.11 SUBSURFACE STRUCTURES AND UTILITIES

- A. The Contractor shall become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area and beneath the surrounding streets. Contractor shall not damage any of those utilities that are to remain and shall leave them accessible and make the necessary provision by sheeting, hanging, supporting or other means necessary to obtain this result, subject to the approval of the New York City Building Department, Department of Transportation, and the utility companies involved.

1.12 DESIGN OF TEMPORARY WORK

- A. Temporary work shall be designed and installed so that the permanent work can be conveniently and adequately erected. Contractor shall be responsible for the adequacy of temporary work.
- B. Temporary work shall be maintained in good condition.
- C. Temporary work shall be changed, shifted, rebuilt, etc., as needed to suit the conditions of the permanent work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All fill and backfill shall be material classified as controlled fill by the New York City Building Code and as herein specified under Part 2 of these specifications, and obtained from the excavation on site, if acceptable, or from borrow sources. Composition shall consist of angular sands and gravels. Flat structured material such as mica (the main component of "mole" rock) falling into the acceptable gradation or other material affecting the permeability and structural characteristics of sand material shall be no more than 0.4% of the total material. Suitable excavated material shall be approved by the Commissioner.
 - 1. General Fill: shall be free draining, well-graded natural sand, gravel, crushed rock, recycled concrete aggregate, or a mixture of these, free of deleterious materials, organic material,

3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.
- G. Examine drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.
- H. Compliance with all federal, state and local environmental and health and safety regulators, including but not limited to Occupational Safety and Health Administration (OSHA).

1.07 QUALITY ASSURANCE

- A. Qualifications of Contractor for work described in this Section shall not be less than five (3) years of field experience in earthwork operations.
- B. Field Testing of Fill Areas: Prepared fill lifts will be tested and approved by the Commissioner before construction of any further work thereon. Inspection and test of subgrades and fill layers will be taken as follows:
 1. Below building slabs and pit areas: For each compacted fill layer, make 1 field density test for every overlaying 2,500 sq-ft of building slab-on-grade or paved area-on-grade, but not less than 3 tests per lift. Perform field density tests in accordance with ASTM D 2922.
 2. Foundation wall backfill: Take at least 3 field density tests in accordance with ASTM D 2922 at locations and elevations as directed by the Commissioner.

1.08 DEFINITIONS

- A. Wherever the word "excavating", "excavate", "excavation", "carried down", "remove", etc., are used, they shall be taken to include the removal of all existing work, including brick work, rubble work, former foundation remnants rubbish, earth, as well as rock, boulders, steel grillages and concrete and all other materials and obstructions encountered; they shall also be taken to include all sheet piling, bracing, pumping, and all operations and items needed for the proper execution of the work. Excavation is considered unclassified.
- B. Where the words "finished grades", "finished grade lines", or "future finished grades", appear in these specifications, they shall be taken to mean the finished elevations as indicated on the drawings.
- C. Rough grading consists of cutting or filling to the elevation established on the Contract Drawings.

1.09 PROTECTION

- A. The excavation and dewatering (if required) shall be executed so that no damage or injury will occur to the existing public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric or any other pipes. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall repair such damage and shall assume all responsibility for such injury.
- B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines and telecommunication lines) to remain in use within and adjacent to the area affected by the work of this project.
- C. Monuments, bench marks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced.

descriptions, drawings, and equipment specifications and other information detailing the means and methods to be used for local dewatering of deep pits. Methods shall be such that the groundwater lowering at the perimeter of the site does not exceed one foot or a level required to protect any adjacent structures.

- E. Certification For Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports by the subsoil exploration consultant, the Drawings, and all other Contract Documents.

1.06 PROJECT CONDITIONS

- A. The Contractor, by careful examination, shall inform himself as to the nature and location of the work; the conformation of the ground, the nature of the subsurface conditions; the locations of the groundwater table; the character, quality, and quantity of the materials to be encountered; the character of the equipment and facilities needed preliminary to and during the execution of the work; and all other matters which can in any way effect the work.
- B. The Contractor shall be held to have visited the site and to have familiarized himself with the existing conditions of adjoining properties, utilities and buildings.
- C. Borings are available for the Contractor's review. City of New York makes no predictions or representations regarding the character or extent of soil, rock, or other subsurface conditions to be encountered during the work. The Contractor shall make his own deductions of the subsurface conditions which may affect the methods or cost of construction of the work hereunder, and he agrees that he will make no claims for damages or compensations, except as are provided under the agreement, should he find conditions during the progress of the work different from those as calculated and/or anticipated by him. Additional borings and other exploratory operations may be performed by Contractor, at the Contractor's option and following the Commissioner approval. No change in the Contract Sum will be authorized for such additional exploration undertaken by the Contractor.
- D. Soil samples taken from the borings are available for the Contractor's inspection.
- E. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the work. The Contractor shall conform to all New York City and State, and Federal regulations in regard to the transportation of materials to and from and at the job site and shall secure in advance such permits as may be required.
- F. Existing Utilities: Locate existing underground utilities in and beyond the areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during the work.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 2. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by the Construction Manager and then only after acceptable temporary utility services have been provided. Provide minimum of 48-hour notice to the Construction Manager, and receive written notice to proceed before interrupting any utility.

4. Erosion and Sedimentation Controls - 31 25 00
 5. Excavation Support and Monitoring - Section 31 50 00
- B. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and

1.04 REFERENCES

- A. All work and materials under this section shall conform to the latest revision of the following standard specifications, where not otherwise required by the Contract Documents.
- B. Perform all work in accordance with all applicable City, County, State, and Federal Codes and authorities having jurisdiction.
- C. The following publications form a part of this Specification to the extent indicated by the specific citations in other paragraphs of this Specification. In case of conflict, the particular requirements of this Specification shall govern, unless indicated otherwise.
1. American Society for Testing and Materials (ASTM) and American Association of State and Highway Transportation Officials (AASHTO) Publications:
 2. New York City Building Code
 3. The Geotechnical Engineering Study prepared for City of New York Department of Design and Construction by Louis Berger and Associates, P.C., dated January 2009.

1.05 SUBMITTALS

- A. Test Reports: Submit the following information for each source of each material submitted for review and comment by the Commissioner:
1. Test reports on borrow material as follows:
 - a. Particle size analysis in accordance with ASTM D 422 (sieve only).
 - b. Soil classification in accordance with ASTM D 2487
 - c. Moisture content in accordance with ASTM D 2216
 - d. Modified Compaction Curve in accordance with ASTM D 1557.
 2. Include data for all samples indicating the exact location and methods of transportation and placement of all materials.
 3. Include verification that borrow material is not contaminated.
 4. Submit a 5-lb (minimum) sample of each borrow material proposed for use as general fill, drainage fill and controlled fill.
- B. Method Statement: Submit a detailed method statement, drawings, and calculations to be reviewed by the Commissioner. The method statement, drawings and calculations shall be prepared by a Professional Engineer registered in the State of New York. The submittals shall include but not be limited to the following:
1. Earth excavation procedures.
 2. Backfilling and compacting material, equipment and procedures.
- C. Catalog Cuts: Submit catalog cuts and manufacturer's literature for compaction equipment, geofabrics and waterproofing.
- D. Dewatering (if required): Include the dewatering plan and the estimated level of ground lowering beyond the site perimeter. Provide narrative and supporting calculations to provide input regarding how the changes in the ground water level at the site will effect the changes on the stability and settlement of the adjacent foundations and how to prevent damage to such buildings. Provide plan

SECTION 31 0000 - EARTHWORK

PART 1 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 and New York City Building Code.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the excavation, foundation construction, filling and grading as shown on the Drawings and specified herein including, but not limited to the following:
1. Removal of existing pavements, curbs, utilities, and former foundation walls, pile caps, grade beams etc, designated for removal; relocation of fence and fence posts when necessary and other structures encountered or left by wreckers, old walls, rubble, etc.
 2. All excavation of earth, concrete, construction debris, uncontrolled fill, remnants of foundations, and other materials to the bottom of foundation subgrades, pile caps, foundation walls, pits and slabs as required and indicated on drawings or to a lower elevation to achieve required bearing.
 3. Excavation, filling and rough grading of site area at adjacent structures and roadways as required and within the Contract Limit Line.
 4. Excavation, filling, grading and compacting to required elevations for all floors and slabs on grade.
 5. Excavation, filling, grading and compacting to required elevations for appurtenances and site work.
 6. Pumping and dewatering where required for work of this section and for foundation work.
 7. Excavation and trenching for mechanical trades, including but not limited to all plumbing, heating, water, gas and electric within the buildings as shown or required by the drawings; backfilling same with clean fill as described hereinafter; and thoroughly compacting to "Rough Grading" elevations. Excavation, filling and grading for mechanical trades outside the building shall be the responsibility of each trade.
 8. Providing additional approved suitable material for filling and rough grading.
 9. Legal disposing, off the site of surplus excavated materials unsuitable for filling or backfilling. Refer to environmental specifications.
 10. Other labor and materials as may be reasonably inferred to be required to make the work under this Section complete.

1.03 RELATED SECTIONS AND DOCUMENTS

- A. Project Specifications
1. Cast In Place Concrete- Section 03 30 00
 2. Protection of Existing Conditions - Section 02 01 10
 3. Protection of Existing Utilities - Section 02 10 00

- C. It shall be the responsibility of the contractor to assure that construction debris does not adversely affect any sensing devices installed as part of this project. Should it be deemed necessary by the Commissioner, City of NY or AHJ, the contractor shall be responsible for the cleaning of all smoke detectors prior to final acceptance.

3.03 TESTS

- A. The fire alarm system vendor shall test the system in accordance with the manufacturer's requirements and NFPA 72 as amended by the NYC Building Code. The vendor shall provide completed reports to the Commissioner for review and approval prior to final acceptance.
- B. Each individual system operation on a circuit-by-circuit basis shall be tested for its complete operation. The procedure for testing the entire fire alarm system shall be set forth with the consent of the code enforcement official, the Commissioner and the manufacturer.

3.04 DOCUMENTATION AND INSTRUCTION

- A. The contractor shall compile and provide to the City of New York three (3) complete manual on the completed system to include SITE SPECIFIC operating and maintenance instruction, catalog cuts of all equipment and components, as-built wiring diagrams and a manufacturer's suggested spare parts list, and an end user training video on DVD disk.
- B. In addition to the above manuals, the Contractor shall provide the services of the manufacturer's trained representative for two (2) separate calendar days for a period of four (4) hours per day to instruct the City of New York's designated personnel on the operation and maintenance of the entire system.
- C. As-built drawings shall consist of the following:
 - 1. Complete revision of all previously submitted drawings.
 - 2. Point-to-point depiction of all device wiring on the device layout floor plans.
 - 3. One (1) set of B-size, laminated as-built drawings.
 - 4. Two (2) sets of 30"x42" inch 1/16"=1' scale drawings showing all points of fire alarm. One set shall be submitted with the close-out documents. Second set shall be mounted in frame with a lexan cover. These drawing must be submitted to Commissioner for approval.
 - 5. Fire Alarm Matrix designed per NFPA 72: FIGURE A.14.6.2.3(9).
- D. Turnover of all software database hard/soft copies shall be required. This shall include all possible programming software logs, diskettes or CDs containing exported project files, hard copies of all device maps, the revision number of the version of programming utility used, and all required passwords. The turnover of all database information shall occur prior to the end of the One (1) year guarantee period (or period as amended earlier in this specification).

END OF SECTION

- L. All wiring shall be color-coded throughout, to New York City Electrical Code standards.
- M. Power-limited/Non-power-limited NEC wiring standards SHALL BE OBSERVED.
- N. All junction box covers shall be painted red and labeled FIRE ALARM SYSTEM.
- O. Fire alarm system wiring shall not co-mingle with any other system wiring in the facility. Conduits shall not be shared under any circumstance. Only when fire alarm wiring enters the enclosure of a monitored or controlled system will co-habitation be permitted (i.e. at fan starters or elevator controllers). THIS WILL BE FIELD INSPECTED BY THE COMMISSIONER.
- P. Fire alarm control panel enclosures shall have engraved labels indicating, "FIRE ALARM SYSTEM", and the areas of the building served by that panel.
- Q. Auxiliary relays shall be appropriately labeled to indicate "FIRE ALARM SYSTEM" and their specific function (i.e. FAN S-1 SHUTDOWN).
- R. All fire alarm wiring shall be continuous and unspliced. Terminations shall only occur at fire alarm devices or control panel enclosures under terminal screws. All other splicing methods are specifically disallowed (i.e. plastic wirenuts).
- S. All fire alarm wiring shall be installed using a dedicated system of supports (i.e. bridle rings). Fire alarm wiring shall not be bundled or strapped to existing conduit, pipe or wire in the facility. THIS WILL BE FIELD INSPECTED BY THE COMMISSIONER.
- T. All fire alarm wiring shall be sleeved when passing through any wall, using conduit sleeves (1" min.) with bushings, and fire stopped in accordance with Code.
- U. All low voltage operation shall be provided from the fire alarm control panel.
- V. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated on the Contract Drawings not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Commissioner. Failure to bring such issues to the attention of the Commissioner shall be the exclusive liability of the Contractor.
- W. The Contractor shall be responsible for the removal of ENTIRE existing fire alarm system components and controls on the demolition drawing shown or not, upon approval of the AHJ and the Commissioner. The City of NY reserves the right to retain any existing fire alarm system components, upon their request. All existing fire alarm system components requiring special handling for disposal (due to radioactivity) shall be the responsibility of the contractor. Written proof of proper disposal by the contractor shall be required prior to release of outstanding retainage.

3.02 FIELD QUALITY CONTROL

- A. The system shall be installed and fully tested under the supervision of a trained manufacturer's representative. The system shall be demonstrated to perform all of the function as specified. The contractor or fire alarm equipment vendor shall have no less than two (2) NICET Level II fire alarm technicians dedicated to this project.
- B. The Installing Contract and the Fire Alarm System Vendor shall, upon the request of the Commissioner or City of NY, attend any and all project meetings for the purpose of accurately determining progress.

EMT/RGS and in accordance with NYC requirements. The ground to the FDS shall be made using a NYC accepted method (see NYC electrical code), and the ground wire to the FDS shall be #8 minimum (larger if necessary to meet feed size). The equipment ground leaving from the FDS connecting to the fire alarm equipment shall include a #10 green ground. The FDS panel shall bear an engraved white-core phenolic or bakelite identification nameplate stating in minimum one-quarter inch (1/4") high white letters on a red background "FIRE ALARM FUSED DISCONNECT".

- Z. Where additional circuits are required by the fire alarm system, a Fused Cutout, properly sized shall be included, wired after the FDS. The size of the fuses shall be sized appropriately but be twenty (20) amperes minimum. The fused cut-out panel shall bear an engraved white-core phenolic or bakelite identification nameplate stating in minimum one-quarter inch (1/4") high white letters on a red background "FIRE ALARM FUSED CUT-OUT". The neutral shall not be bonded in the Fused cutout".

PART 3.00 - EXECUTION

3.01 INSTALLATION

- A. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's wiring diagram. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the manufacturer, approved by the NYC Fire Department, NYC Fire Code, NYC Electrical Code, and specified within.
- B. All penetration of floor slabs and firewalls shall be sleeved (1" conduit minimum) fire stopped in accordance with all local fire codes.
- C. End of Line Resistors shall be furnished as required for mounting as directed by the manufacturer. Devices containing end-of-line resistors shall be appropriately labeled. Devices should be labeled so removal of the device is not required to identify the EOL device.
- D. All manual pull stations shall be mounted 42 - 48 inches above the finished floor, as measured to the handle.
- E. All audio/visual devices shall be mounted 80 inches above the finished floor, as measured to the lens. Devices shall be mounted no less than 6 inches from the ceiling. Audio visual devices shall be mounted per NFPA 72.
- F. No area smoke detectors shall be mounted within 36 inches of any HVAC supply, return air register or lighting fixture.
- G. No area smoke or heat detector shall be mounted within 12 inches of any wall. All detectors shall be installed in strict accordance with NFPA 72 as amended in Appendix Q guidelines for such devices.
- H. All mechanical rooms, boiler rooms, wiring closets, custodian rooms, attic spaces, etc. or areas with no hung ceilings shall be piped with 3/4" conduit and installed as necessary by the NYC Electrical Code. All areas in public view shall be in metal conduit. All boxes must be painted red and labeled "FIRE ALARM".
- I. All addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, or door release. Label all addressable modules as to their function.
- J. All low voltage wiring terminated to the fire alarm system shall be PLENUM RATED with no exceptions and no less than No. 12 AWG in size for NAC circuits and 16 AWG for Initiating Circuits, and solid copper per the NYC Electrical code. Exposed wire above 8ft AFF shall be 150 degrees C and as specified in the electrical code.
- K. All line voltage (120VAC) wiring shall be no less than No. 12 AWG in size, and solid copper. This shall include all system grounding.

- Q. Strobes, G1RF-VM Series or approved equal: Provide EST Series G1RF-VM series low profile wall mounted strobes at the locations shown on the drawings. Strobes shall provide synchronized flash outputs. Strobe output shall be field selectable as indicated on the drawings in one of the following intensity levels; 15cd, 30cd, 75cd or 110cd. Low profile strobes shall mount in a North American 1-gang box or surface mounted on a matching back box provided by the manufacturer, as directed in the field.
- R. Strobes, G1-VM Series or approved equal with Blue Lens and "Carbon Monoxide" labeling. Where "Carbon Monoxide" strobes are indicated on the project plans provide Edwards EST Genesis series white strobe with a blue lens and special marking "Carbon Monoxide". The strobe shall activate if the CO sensor in the SIGA2-PCOS or approved equal combination smoke and CO detector activates. Strobe output shall be field selectable as indicated on the drawings in one of the following intensity levels; 15cd, 30cd, 75cd or 110cd. This device shall be circuited separately and be mounted similarly as a fire alarm Notification Appliance Device.
- S. Temporal Horn Strobes, G1RF-HDVM Series or approved equal: Provide EST Series G1RF-HDVM low profile wall mount horn/strobes or approved equal at the locations shown on the drawings. The horn/strobe shall provide an audible output of 84.4 dBA at 10 ft at the high setting and for smaller room size locations (as indicated on the plans) a low dB setting (field selectable) of 79.4 dB at 10 ft. when measured in reverberation room per UL-464. Strobes shall provide synchronized flash outputs. The strobe output shall be as indicated on the drawings in one of the following field selectable intensity levels; 15cd, 30cd, 75cd & 110cd devices. The horn shall have a selectable steady or synchronized temporal output. Low profile horn/strobes shall mount in a North American 1-gang box or surface mounted on a matching back box provided by the manufacturer, as directed in the field.
- T. Temporal Horn, G1RF-HD: Provide EST Series G1RF-HD or approved equal low profile wall mount horn at the locations shown on the drawings. The horn shall provide an audible output of 84.4 dBA at 10 ft at the high setting and for smaller room size locations (as indicated on the plans) a low dB setting (field selectable) of 79.4 dB at 10 ft. when measured in reverberation room per UL-464. The horn shall have a selectable steady or synchronized temporal output. Low profile horn shall mount in a North American 1-gang box or surface mounted on a matching back box provided by the manufacturer, as directed in the field.
- U. Weather Rated Strobes, Horns and Horn Strobes: Provide EST model WG4 series weather rated Notification Appliance Circuit (NAC) devices or approved equal as indicated on the project plans. Weatherproof NAC devices shall be suitable for temperatures -40 °F to 151 °F and 0 to 95% RH, non-condensing. Weather rated NAC devices shall include a weather resistant color matched mounting box and trim skirt.
- V. Multi-Voltage Control Relays, MR-200 Series or approved equal: Provide remote control relays connected to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings shall be DPDT and rated for 10 amperes at 115 Vac. A single relay may be energized from a voltage source of 24 Vdc, 24 Vac, 115 Vac, or 230 Vac. A red LED shall indicate the relay is energized. A metal enclosure shall be provided.
- W. STI Stopper II Lexan Guards or approved equal: Manual pull stations that are provided with STI Stopper II lexan guards shall include non-audible alarms as required on the plans. They shall be surface or flush mounting, as required for each individual device. Stopper Covers shall only be included on devices shown on the plans to include them.
- X. Operating Instruction/Riser Diagram Holders: Shall be red painted steel, frame holder with clear, Acrylic window with nine inch by twelve inch (9" x 12") dimensions. One (1) holder shall be provided for the fire alarm control panel (FACP)/system operating instructions and one (1) holder shall be provided for a reduced copy (8-1/2" X 11") of the fire alarm system riser diagram. The operating instruction and riser diagram holders shall be mounted adjacent to the fire alarm control panel (FACP).
- Y. Fire alarm equipment shall be powered through an approved Fuse Disconnect Switch (FDS) connected ahead of the main service switch. The FDS shall be heavy duty (200,000 rms short circuit amps) safety switch (30 amps minimum, painted red, include a ground and Neutral kit with grounding screw (to bond neutral), include a padlock with Y1 cylinder keyed to a NYC/FDNY 2642 key (use ABUS re-keyable 83-45 or equivalent lock). All wiring shall be #10 minimum THHN or equivalent run in ¾ inch

- J. Intelligent Modules — General: It shall be possible to address each Intelligent Signature Series module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment: Temperature: 32oF to 120oF (0oC to 49oC), Humidity: 0-93% RH, non-condensing.
- K. Single Input Module, SIGA-UM (Waterflow Detectors, Tamper Switches etc.) or approved equal: Provide intelligent single input modules SIGA-UM or approved equal. The Single Input Module shall provide one (1) supervised Class A input circuit capable of a minimum of 4 personalities, each with a distinct operation.
- L. Single Input Signal Module, SIGA-CC2A or approved equal: Provide intelligent single input signal modules SIGA-CC2A. The Signal Module shall provide one (1) supervised Class A output circuit capable of a minimum of 2 personalities, each with a distinct operation.
- M. Control Relay Module, SIGA-CR: Provide intelligent control relay modules SIGA-CR or approved equal. The Control Relay Module shall provide one form "R" dry relay contact rated at 2 amps @ 24 Vdc to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware. The control relay module shall be suitable for mounting on North American 2 1/2" (64mm) deep 1-gang boxes and 1 1/2" deep 4" square boxes with 1-gang covers.
- N. Manual Pull Station, SIGA-270 or approved equal: Provide intelligent single action fire alarm pull stations as indicated on the project plans. The fire alarm station shall be of metal construction with an internal toggle switch. Finish the station in red with silver "PULL IN CASE OF FIRE" English lettering. The manual station shall be suitable for mounting on North American 2 1/2" (64mm) deep 1-gang boxes and 1 1/2" (38mm) deep 4" square boxes with 1-gang covers. It shall be possible to address each Signature Series fire alarm pull station without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The manual stations shall have a minimum of 2 diagnostic LEDs mounted on their integral, factory assembled single or two stage input module. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The station shall be capable of storing up to 24 diagnostic codes that can be retrieved for troubleshooting assistance. Input circuit wiring shall be supervised for open and ground faults. Fire alarm pull stations shall be suitable for temperatures 32oF to 120oF (0oC to 49oC), Humidity: 0-93% RH, non-condensing.
- O. Weatherproof Pull Station, MPSR1-S45W-GE or approved equal: Provide conventional single action weatherproof manual pull stations as shown on the project plans. The weatherproof fire alarm station shall be of metal construction with an internal toggle switch and weather rated gasket. Finish of the station shall be red with silver "FIRE ALARM PULL DOWN" English lettering. The station shall include a weather rated single gang mounting box. Weatherproof fire alarm manual pull stations shall be suitable for temperatures -30 °F to 150 °F (-35 °C to 66 °C) and 0 to 85% RH, non-condensing. Each station shall be monitored by an addressable monitor module which shall be located in an interior (heated and conditioned) space.
- P. Notification Appliances – General: All appliances shall be UL Listed for Fire Protective Service. All strobe appliances or combination appliances with strobes shall be UL 1971 and ULC S526 Listed. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel (NO EXCEPTIONS) specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions. Any appliances that do not meet the above requirements, and are submitted for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from THE CONTROL PANEL MANUFACTURER clearly stating that the control equipment (as submitted) is 100% compatible with the submitted Notification Appliances.

- E. Sleeping Room Smoke and CO Detection: Provide combination intelligent addressable photoelectric smoke and Carbon Monoxide (CO) detectors EST model SIGA2-PCOS with 82 dB (per UL464) audible base SIGA-AB4GT or approved equal for installation inside each sleeping room and as indicated on the project plans. The "sleeping room" smoke and CO detection devices shall be fully addressable with a built in sounder. The detector shall be arranged so that a fire alarm condition shall sound the internal horn at a Temporal 3 pattern and a Carbon monoxide condition shall sound the internal horn at a Temporal 4 pattern per NFPA 720. All sounders within the dwelling shall sound together in tandem at the same temporal rate. The fire alarm control panel shall be UL-Listed UL2017 for general purpose signaling. The CO detector shall also be UL2075 listed and provide the control panel with an "end of life" signal for the CO element and the CO element of the detector shall be field replaceable. The photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. A smoke alarm or CO alarm from the sleeping room detector shall not cause automatic building evacuation; rather indicate the alarm condition at the main fire alarm panel and at designated remote displays. The CO detector shall report as a separate address to the fire alarm control panel and be treated as a Supervisory signal. Rooms that include more than one detector (i.e. a single living space with two or more smoke/co detectors) shall be arranged so that all detectors within the space shall activate their built-in sounder bases in a common alarm fashion (if one detector alarms, the sounders from all detectors shall sound in the space) at the appropriate Temporal rate (Temporal 3 or Temporal 4). The detector shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop PC, the SIGA-PRO Signature Program/Service Tool, or approved equal. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. Sleeping rooms designated handicapped accessible, shall include a wall mounted strobe light meeting ADA code that is activated by the building alarm AND by the in-room addressable smoke detector. The fire alarm vendor shall provide control module(s) arranged so that rooms addressable smoke detectors can activate the strobe in the associated guest room independent of building strobe devices.
- F. Addressable Carbon Monoxide (CO) Detector, EST model SIGA2-COS with sounder base or approved equal. Provide intelligent addressable Carbon Monoxide Alarms as shown on the project plans. The CO detection element shall indicate a trouble condition at the FACP signaling end of life and be field replaceable. The CO detector shall be UL 2075 listed.
- G. Standard Detector Mounting Bases, SIGA-SB / SIGA-SB4 or approved equal: Provide standard detector mounting bases SIGA-SB suitable for mounting on North American 1-gang, 3½" or 4" octagon box and 4" square box. The base shall, contain no electronics, support all Signature Series detector types and have the following minimum requirements: Removal of the respective detector shall not affect communications with other detectors, Terminal connections shall be made on the room side of the base, bases that must be removed to gain access to the terminals shall not be acceptable. The base shall be capable of supporting one (1) Signature Series SIGA-LED Remote Alarm LED Indicator. Provide remote LED alarm indicators where shown on the plans.
- H. Audible Detector Mounting Base, SIGA-AB4GT or approved equal. Where shown on the project plans include detector audible/sounder base model SIGA-AB4GT or approved equal. The sounder base shall be capable of two tones, Temporal 3 for a fire condition and Temporal 4 for a Carbon monoxide condition. The tones shall be fully programmable and also synchronize the sound with other sounder bases. The system shall be UL2017 listed for dual signaling for this purpose.
- I. Duct Detector Housing, SIGA-SD or approved equal: Provide model SIGA-SD or approved equal Low profile intelligent addressable DUCT smoke detector as indicated on the project plans. Provide for variations in duct air velocity between 100 and 4,000 feet per minute and include a wide sensitivity range of .79 to 2.46%/ft. Obscuration. Include one Form-C shut down relay rated 2.0 amps @ 30 Vdc and also include slave high contact relays if required. Provide an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. The addressable DUCT housing shall be suitable for extreme environments, including a temperature range of -20 to 158 degrees F (-29 to 70 degrees Celsius) and offer a harsh environment gasket option. Provide Remote Alarm LED Indicators SIGA-LED and/or remote test station model SD-TRK as indicated on the project plans.

B. Intelligent Detectors — General: The System Intelligent Detectors shall be capable of full digital communications using both broadcast and polling protocol. Each detector shall be capable of performing independent fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted deceptive nuisance alarms. Signal patterns that are not typical of fires shall be eliminated by digital filters. Devices not capable of combining different fire parameters or employing digital filters shall not be acceptable. Each detector shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detector head. Distributed intelligence shall improve response time by decreasing the data flow between detector and analog loop controller. Detectors not capable of making independent alarm decisions shall not be acceptable. Maximum total analog loop response time for detectors changing state shall be 0.5 seconds. Each detector shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm communication with the analog loop controller. A red LED shall flash to display alarm status. The detector shall be capable of identifying up to 32 diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient "Environmental Thresholds" approximately six times an hour. The microprocessor shall continually monitor the environmental impact of temperature, humidity, other contaminants as well as detector aging. The process shall employ digital compensation to adapt the detector to both 24-hour long term and 4-hour short-term environmental changes. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and the "learned" base line sensitivity. The base line sensitivity information shall be updated and permanently stored at the detector approximately once every hour. The intelligent analog detectors shall be suitable for mounting on any Signature Series detector mounting base.

- C. Fixed Temperature/Rate of Rise Heat Detector, SIGA2-HRS or approved equal: Provide intelligent combination fixed temperature/rate-of-rise heat detectors SIGA-HRS. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate-of-rise alarm point of 15°F (9°C) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
- D. Photoelectric Smoke Detector, SIGA2-PS or approved equal: Provide intelligent photoelectric smoke detectors SIGA2-PS or approved equal. The analog photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop PC, the SIGA-PRO Signature Program/Service Tool or approved equal. The photo detector shall be rated for ceiling installation at a minimum of 30 ft (9.1m) centers and be suitable for wall mount applications. The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft (0.91m) high and 3 ft (0.91m) wide with air velocities up to 5,000 ft/min. (0-25.39 m/sec) without requiring specific duct detector housings or supply tubes. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment: Temperature: 32°F to 120°F (0°C to 49°C), Humidity: 0-93% RH, non-condensing, Elevation: no limit.

- L. Ethernet Port: Provide a standard 10/100 Base T Ethernet port for connecting to an intranet or a local network. This connection shall support the downloading of configuration programming to the panel over the network, and provide the capability of diagnostic information from a remote location.
- M. Alpha-Numerical Pager Interface: The system shall have the option to transmit an alphanumeric system activity message, by event, by point descriptor to a commercial paging system of the Commissioner's choice, using TAP Pager protocol.
- N. Booster Power Supply: The Booster Power Supply shall be independent unit that will provide power to visual strobe notification appliances. It shall be possible to configure the NAC's to follow the main panel's NAC or activate from intelligent synchronized modules. The booster NAC's must be configurable to operate independently at any one of the following rates: continuous synchronized, or 3-3-3 temporal. Fault conditions on the power supply shall not impede alarm activation of host NAC circuits or other power supplies. The NAC power supply must be able to provide concurrent power for notification devices, security devices, access control equipment and auxiliary devices such as door holders. . All the NAC Power Supplies shall be synchronized. The power supply shall support up to 24 amp hour batteries.
 - 1. Power supply shall be a minimum of 10 amps and UL 864 Listed.
 - 2. Two Class A independent 3amp NAC circuits. Each being configurable as auxiliary power.
 - 3. All circuits shall be synchronized.
- O. Firefighters Smoke Purge System.
 - 1. Fire Smoke Purge shall include post fire smoke evacuation per NYC Building Code section 912.
 - 2. The manual post fire smoke purge per section 912 of the NYC Building Code. Manual smoke purge shall be integral to the FSCS or located on Led/Switch modules directly adjacent to the smoke control controls and indicators. Controls for smoke purge shall only be available after activation of a built in FDNY/NYC approved 2642 key. A 2-position On/Off switch shall be included by floor or area for manual evacuation of smoke. Each 2-position switch shall include a green indicator that displays when the purge fan is on and a yellow trouble indicator.
 - 3. Fans will not be affected upon system reset. Restarting the fans may be accomplished by turning them back on in an individual sequential fashion or through individual manual switches at the FSCS controls to eliminate the possibility of all fans turning on simultaneously.
 - 4. Under normal circumstances, smoke exhaust fans, respective fire-smoke dampers, motorized dampers shall be closed unless noted otherwise on the project plans.

2.06 COMPONENTS

- A. Intelligent Devices — General: Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number, device address, device type, personality code, date of manufacture, hours in use, time and date of last alarm, amount of environmental compensation left/used, last maintenance date, job/project number, current detector sensitivity values, diagnostic information (trouble codes) and algorithms required to process sensor data and perform communications with the loop controller. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary.

16. Detectors shall automatically send an alert message to the LCD Users Interface and illuminate the service detector LED when they reach 80% dirty and latch a trouble when they reach 100% dirty to ensure maintenance action is performed.
- F. Main Operators Display Operations:
1. Provide a discreet system control switch provided for reset, alarm silence, panel silence, remote disconnect, drill switch, and up/down/right/left switches.
 2. Backlit LCD display shall be a minimum 80 character display.
 3. Each point shall have a 40 character custom message.
 4. Service Detector LED: Provide indication when a detector needs servicing
 5. Programmable Switches: Provide minimum of 2 programmable switches with corresponding LEDs. The switches shall be programmed for disable/enable or activate/restore functions as follows:
 - a. Disable NAC
 - b. Disable Elevator Recall
 - c. Disable Fan Shutdown
 6. Alarm and Trouble Annunciator: Provide minimum of 32 zones of LED annunciation with red alarm and yellow trouble indicators; 8 zones may be utilized for supervisory zone annunciation. Devices on addressable loop circuits shall be identified by display or their address and by their condition (alarm, pre-alarm, monitor, supervisory, and trouble).
- G. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.
- Verify project circuit wiring requirements.
- H. Smoke-Alarm Verification:
1. Initiate an audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
 3. Record events by the system printer.
 4. Sound general alarm if the alarm is verified.
 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- I. Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change to alternate settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.
- J. Digital Alarm Communicator Transmitter: The system shall have an integrated off premise communications capability using a digital alarm communications transmitter (DACT) for sending system events to multiple central monitoring station (CMS) receivers. The system shall provide the CMS(s) with point identification of system events using Contact ID protocol. The dialer shall have the capability to support up to two (2) individual accounts and to send account information to two (2) different receivers, each having a primary and secondary telephone access number. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system designed. In the event of a panel CPU failure during a fire alarm condition, the DACT degraded mode shall transmit a general fire alarm signal to the CMS.
- K. Digital data transmission shall include the following (Contact ID)
1. Address of the alarm-initiating device.
 2. Loss of ac supply or loss of power.
 3. Low battery.
 4. Abnormal test signal.
 5. Communication bus failure.

- B. The control panel shall include all required hardware, software and system programming to provide a complete and operational system. The control panel shall assure that life safety takes precedence among all panel activities.
- C. The control panel shall include the following capacities:
1. Support one loop of 250 analog/addressable points, expandable up to two loops for a total of 500 points.
 2. Support up to 8 fully supervised remote annunciators.
 3. Support digital dialer with Contact ID format.
 4. Support up to 1000 chronological events.
- D. The control panel shall include the following features:
1. Ability to download or upload site applications and system diagnostics remotely through an Ethernet connection, or DACT.
 2. Provide electronic addressing of analog/addressable devices. Rotary and dip switch addressing shall not be considered equal.
 3. Provide an operator interface display that shall include functions required to annunciate command and control system functions.
 4. Provide an internal audible signal with different programmable patterns to distinguish between alarm, supervisory, trouble and monitor conditions.
 5. Provide system reports that provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.
 6. Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords, restart the system and clear control panel event history file.
 7. Provide an authorized operator to perform test functions within the installed system.
- E. The control panel shall provide the following intelligent and intuitive diagnostic software tools.
1. Fast Ground Check
 2. Allow quick wiring diagnostics for ground faults every 4 seconds to troubleshoot ground faults much quicker and determine if they have been fixed or not.
 3. Recalibrate Device
 4. The control panel recalibrates any devices that have been cleaned. The Recalibrate Device feature will immediately reset the environmental compensation and dirtiness levels for faster verification of cleaned devices.
 5. Test Fire
 6. The control panel sends a test command to a detector or input module to activate. This allows for proper operation and programming testing of the device.
 7. Flash Device LED
 8. It shall be possible to activate any device LED from the control panel menu to help troubleshooting or locate a specific device on a loop.
 9. Walk Test
 10. Walk test will allow the operator to test individual zones or devices without placing an alarm event on the system.
 11. It shall be possible to perform a walk test in a silent or audible test mode. Silent test mode shall display the test results on the LCD display. Audible test confirmation shall sound a coded signal on the systems NAC circuits.
 12. It shall be possible to activate Walk Test by zone or device to ensure the balance of the system remains in service to protect the premises.
 13. It shall be possible to view and print a walk test report showing the activation and restoration of all walk test events.
 14. Device Maintenance
 15. It shall be possible to view and print a report of all detectors dirtiness levels to optimize cleaning schedules. The report shall filter for all devices, devices that are 20% dirty or devices that are 80% dirty. The report shall show the device, how dirty it is by percentage and its sensitivity setting.

- F. Provide a dedicated 24VDC circuit to feed all auxiliary relays required for inductive loads. Circuits shall be supervised via an end-of-line relay and addressable input module. Auxiliary relays shall not derive their power from the starter or load being controlled.
- G. Each control or data gathering panel shall have a dedicated 20Amp-120VAC minimum feed. An appropriate fuse cut out shall be included, wired as indicated in the Building Code for the City of NY.
- H. In no case shall any fire alarm circuit be sized beyond 80% of circuit capacity.

2.03 FIRE ALARM SYSTEM SEQUENCE OF OPERATION

- A. See Project Drawings for custom sequence of Temporal 3 system with Sleeping rooms.

2.04 SUPPORT FOR INSTALLER AND CITY OF NEW YORK MAINTENANCE

- A. Provide a coded one-man walk test feature. Allow audible or silent testing. Signal alarms and troubles during test. Allow receipt of alarms and programmed operations for alarms from areas not under test.
- B. Provide internal system diagnostics and maintenance user interface controls to display/report the power, communication, and general status of specific panel components, detectors, and modules.
- C. Provide loop controller diagnostics to identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the circuit wiring of remote module shall be identified by device address.
- D. Allow the user to display/report the condition of addressable analog detectors. Include device address, device type, percent obscuration, and maintenance indicator. The maintenance indicator shall provide the user with a measure of contamination of a device upon which cleaning decisions can confidently be made.
- E. Allow the user to report history for alarm, supervisory, monitor, trouble, smoke verification, watchdog, and restore activity. Include Facility Name, Licensee, Project Program Compilation date, Compiler Version, Project Revision Number, and the time and date of the History Report.
- F. Allow the user to disable/enable devices, zones, actions, timers and sequences. Protect the disable function with a password.
- G. Allow the user to activate/restore outputs, actions, sequences, and simulate detector smoke levels.
- H. Allow the service user to enter time and date, reconfigure an external port for download programming, initiate auto programming and change passwords. Protect these functions with a password.
- I. THE CITY OF NY SHALL RETAIN COMPLETE RIGHTS AND OWNERSHIP TO ALL SOFTWARE RUNNING IN THE SYSTEM. The fire alarm equipment vendor shall provide useable hard and soft copies of the software database to the City of NY at the end of the warranty period. The database provided shall be useable by any authorized and certified distributor of the product line, and shall include all applicable passwords necessary for total and unrestricted use and modification of the database. The Commissioner shall define the extent of hardcopy database documentation to be provided.

2.05 UL LISTED AND APPROVED EQUIPMENT

- A. The control panel shall contain a microprocessor with 10/100 Ethernet media access controller (MAC). The system shall be designed specifically for fire detection, and notification applications. The control panel shall be listed and approved for the application standard(s) as listed under the General section. Panel shall be Edwards Model EST i0500, or approved equal of Honeywell or TYCO.

PART 2.00 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The catalog numbers used are those of Edwards EST by UTC Fire and Security or approved equal by Honeywell or TYCO, and constitute the type and quality of equipment to be furnished.
- B. All products used shall be of a single manufacturer. Submission of notification appliances, auxiliary relays, or documentation from other than a single manufacturer shall not be acceptable and will be grounds for immediate disapproval without comment.
- C. The Fire Alarm / Life Safety System supplied under this specification shall be a microprocessor-based. All Control Panel Assemblies and connected Field Appliances shall be both designed and manufactured by the same company, and shall be tested and cross-listed as compatible to ensure that a fully functioning Life Safety System is designed and installed.

2.02 CIRCUITING GUIDELINES

- A. Each Signaling Line Circuit (SLC) shall be circuited so device loading is not to exceed 80% of loop capacity in order to leave for space for future devices. The loop shall have Class A operation.
- B. NAC Circuits shall have Class A operation. Each of the following types of alarm notification appliances shall be circuited as shown on the drawings but shall be typically as follows:
 - 1. Audible Signals: Provide sufficient spare capacity to assure that the addition of five (5) audible devices can be supported without the need for addition control components (power supplies, signal circuit modules, amplifiers, batteries, etc.)
 - 2. Visual Signals: Provide sufficient spare capacity to assure that the addition of three (3) visual devices can be supported without the need for addition control components (power supplies, signal circuit modules, batteries, etc.)
- C. Where it is necessary to interface conventional initiating devices provide intelligent input modules to supervise Class A zone wiring.
- D. Each of the following types of devices or equipment shall be provided with supervised circuits as shown on the drawings but shall be typically as follows:
 - 1. Sprinkler Valve Supervisory Switches: Provide one (1) supervisory module circuit for each sprinkler valve supervisory switch.
 - 2. When waterflow and tamper switches exist at the same location, provide one (1) dual input addressable module. When odd numbers of devices exist at a single location, provide additional single input addressable modules.
- E. Each of the following types of remote equipment associated with the fire alarm system shall be provided with a form 'C' control relay contact as shown on the drawings, but shall be typically as follows:
 - 1. HVAC Fan Systems: Provide one (1) shutdown control relay contact for each HVAC fan system.
 - 2. HVAC Supply Fans: Provide one (1) shutdown control relay contact for each HVAC supply fan.
 - 3. HVAC Return Fans: Provide one (1) shutdown control relay contact for each HVAC return fan.
 - 4. Dedicated smoke exhaust fans used for smoke control or smoke purge: Provide one (1) addressable control module with auxiliary relay for each Dedicated smoke exhaust fans used for smoke purge. Auxiliary relay contact shall be programmed normally open, closed on smoke control or smoke purge.

designations that shall correspond with those require on the control panel and floor plan drawings. End-of-line resistors (and values) shall be depicted.

4. Control panel termination drawing(s). Shall depict internal component placement and all internal and field termination points. Drawing shall provide a detail indicating where conduit penetrations shall be made, so as to avoid conflicts with internally mounted batteries. For each additional data-gathering panel, a separate control panel drawing shall be provided, which clearly indicated the designation, service and location of the control enclosure. End-of-line resistors (and values) shall be depicted.
 5. See section 3.4 DOCUMENTATION AND INSTRUCTION for other documents relating to this section.
 6. Device typical wiring diagram drawing(s) shall be provided which depict all system components, and their respective field wiring termination points. Wire type, gauge, and jacket shall also be indicated. When an addressable module is used in multiple configurations for monitoring or controlling various types of equipment, different device typical diagrams shall be provided. End-of-line resistors (and values) shall be depicted.
 7. Device layout floor plans shall be created for every area served by the fire alarm system. CAD Files (AutoCAD – latest edition) shall be provided by the Commissioner for the use of the fire alarm system equipment vendor in the preparation of the floor plans. Floor plans shall indicate accurate locations for all control and peripheral devices. Drawings shall be NO LESS THAN 1/8-INCH SCALE. All addressable devices shall be depicted with a discrete address that corresponds with that indicated on the Riser Diagram. All notification appliances shall also be provided with a circuit address that corresponds to that depicted on the Riser Diagram. If individual floors need to be segmented to accommodate the 1/8" scale requirements, KEY PLANS and BREAK-LINES shall be provided on the plans in an orderly and professional manner. End-of-line resistors (and values) shall be depicted.
 8. Contained in the title block of each drawing shall be symbol legends with device counts, wire tag legends, circuit schedules for all addressable and notification appliance circuits, the project name/address, and a drawing description which corresponds to that indicated in the drawing index on the coversheet drawing. A section of each drawing title block shall be reserved for revision numbers and notes. The initial submission shall be Revision 0, with Revision A, B, or C as project modifications require.
- I. Battery calculations shall be provided on a per power supply/charger basis based on 24 hours of supervision and 15 minutes of alarm. These calculations shall clearly indicate the quantity of devices, the device part numbers, the supervisory current draw, the alarm current draw, totals for all categories, and the calculated battery requirements. Battery calculations shall also reflect all control panel component, remote annunciator, and auxiliary relay current draws. Failure to provide these calculations shall be grounds for the complete rejection of the submittal package.
 - J. Table of contents, product data sheets, sequences of operation, battery calculations, installation instructions, licenses, NICET certifications and B-Size (blackline) reduced shop drawings shall be provided by the fire alarm vendor as part of a single, spiral bound submittal book. The submittal book shall have laminated covers indicating the project address, project number, system type, and contractor. The book shall consist of labeled dividers, and shall not exceed 9 1/2" in width, and 11 1/2" in height. No less than three (3) sets of submittal booklets shall be provided to the Commissioner for review and comment. Additional copies may be required at no additional cost to the project.
 - K. Scale drawing sets shall be submitted along with the submittal booklets. These drawings may be either D-Size or E-Size Blueline drawings and of a sufficient resolution to be completely read. Sets shall be bound and folded so as to not take up more than 100 square inches of space. No less than three (3) sets of scale drawing sets shall be provided to the Commissioner for review and comment. Additional copies may be required at no additional cost to the project.

1.07 WARRANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance or approval by AHJ. The full cost of labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

6. Kitchen hood extinguishing systems status monitoring. Hood activation shall indicate an alarm condition.
7. Fire pumps [(manual, automatic and special service)] status monitoring.
 - a. Pump failure (fail to start) indication
 - b. Pump running indication
 - c. Phase reversal indication
8. Emergency generator status monitoring
 - a. Running indication
 - b. Fail to start / Trouble indication
9. Smoke purge fans and smoke purge damper control circuit termination points shall be identified by the mechanical sub-contractor on his control wiring shop drawings for use by this contractor.
10. New smoke exhaust fan and damper status monitoring sail switches and damper end switches shall be furnished by the mechanical sub-contractor and wired and connected to the fire alarm system by this contractor.
11. Conduit: Section 260519.
12. Wire and Cables: Section 260519.
13. Installing dedicated outgoing RJ-31X telephone lines (2) shall be the responsibility of the Contractor. Establishment of central station monitoring account shall be the responsibility of the fire alarm equipment vendor.

1.06 SUBMITTALS

- A. Provide list of all types of equipment and components provided. This shall be incorporated as part of a Table of Contents, which will also indicate the manufacturer's part number, the description of the part, and the part number of the manufacturer's product datasheet on which the information can be found.
- B. Provide description of operation of the system (Sequence of Operation), similar to that provided in Part 2 of this Section of the Specifications, to include any and all exceptions, variances or substitutions listed. Any such exceptions, variances or substitutions that were not listed and are identified in the submittal, shall be grounds for immediate disapproval without comment. The sequence of operation shall be project specific, and shall provide individual sequences for every type of alarm, supervisory, or trouble condition that may occur as part of normal or off-normal system use.
- C. Provide manufacturer's ORIGINAL printed product data, catalog cuts and description of any special installation procedures. Photocopied and/or illegible product data sheets shall not be acceptable. All product datasheets shall be highlighted or stamped with arrows to indicate the specific components being submitted for approval.
- D. Provide manufacturer's installation instruction manual for specified system.
- E. Provide samples of various items when requested.
- F. Provide copy of NYS License to perform such work.
- G. Provide copies of NICET Level II Fire Alarm certifications for the two (2) technicians assigned to this project.
- H. Provide shop drawings as follows:
 1. Coversheet with project name, address and drawing index.
 2. General notes drawing with peripheral device backbox size information, part numbers, device mounting height information, and the names, addresses, point of contact, and telephone numbers of all contract project team members.
 3. Device riser diagram that individually depicts all control panels, annunciators, addressable devices, and notification appliances. Shall include a specific, proposed point descriptor above each addressable device. Shall include a specific, discrete point address that shall correspond to addresses depicted on the device layout floor plans. Drawing shall provide wire specifications, and wire tags shown on all conductors depicted on the riser diagram. All circuits shall have

- B. Underwriters Laboratories Inc.: The system and all components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:

UL 864/U0JZ, APOU Control Units for Fire Protective Signaling Systems.
UL 268 Smoke Detectors for Fire Protective Signaling Systems.
UL 268A Smoke Detectors for Duct Applications.
UL 217 Smoke Detectors Single Station.
UL 521 Heat Detectors for Fire Protective Signaling Systems.
UL 228 Door Holders for Fire Protective Signaling Systems.
UL 464 Audible Signaling Appliances.
UL 1638 Visual Signaling Appliances.
UL 38 Manually Activated Signaling Boxes.
UL 346 Waterflow Indicators for Fire Protective Signaling Systems.
UL 1971 Standard for Signaling Devices for the Hearing Impaired
UL 1481 Power Supplies for Fire Protective Signaling Systems.
UL 1711 Amplifiers for Fire Protective Signaling Systems.
UUKL The Fire Alarm system shall be UUKL for Smoke Control.

- C. This installation shall comply with:

1. Americans with Disabilities Act (ADA)
2. National Fire Protection Association Standards: NFPA72
3. Local and State Building Codes and NYCBC.
4. International Standards Organization (ISO): ISO-9001
5. All power and wire requirements shall follow the 2011 NYC Electrical Code.
6. 2014 NYC Building Code (Chapter 9, Chapter 30, Mechanical Code, Appendix K & Q and other sections as they apply).
7. Utilize OTCR Approved Fire Alarm Equipment.
8. The requirements of the City of New York Building Department and the NYC Fire Department.

1.04 RELATED DOCUMENTS

- A. Secure permits and approvals prior to installation.
- B. Prior to commencement and after completion of work notify NYC Fire Department.
- C. See Section 01 9113 for General Commissioning Requirements.
- D. Submit letter of approval for installation before requesting acceptance of system.

1.05 RELATED WORK

- A. The Contractor shall coordinate 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 waterflow and supervisory switches shall be furnished and installed by the fire protection sub-contractor, but wired and connected by the contractor. Modification of existing sprinkler devices to accommodate monitoring by the new fire alarm system shall be the responsibility of the contractor.
 2. Duct smoke detectors shall be furnished, wired and connected by the contractor. The HVAC sub-contractor shall furnish necessary duct opening to install the duct smoke detectors.
 3. New air handling and smoke exhaust system fan control circuits and status contacts to be furnished by the HVAC control equipment.
 4. Elevator recall control circuits to be provided by the elevator control equipment. The operation of the elevators shall be in accordance with Chapter 30 and Appendix K.
 5. Dry pipe/deluge sprinkler system release valve control circuits and supervision contacts shall be provided by the dry pipe/deluge sprinkler system control equipment.

SECTION 28 3100 - 2014 NYC BUILDING CODE - TEMPORAL 3 CLASS A FIRE ALARM

PART 1.00 - GENERAL

1.01 DESCRIPTION

- A. The requirements of the Contract Documents, including the General and Supplementary General Condition and Division 1 - General Requirements shall apply to the work of this section.
- B. All exceptions taken to these Specifications, all variances from these Specification and all substitutions of operating capabilities or equipment called for in these Specification shall be listed in writing and forwarded to the Commissioner. Any such exception, variances or substitutions that were not listed at the time of bid and are identified in the submittal, shall be grounds for immediate disapproval without comment.
- C. The entire system shall be installed with aesthetics in mind. All control panels and remote annunciators installed in public spaces shall be semi-flush mounted with no exposed conduit or cable trays.
- D. This system shall utilize Class A fire alarm wiring per DDC requirements. Any contrary wording in this specification, drawing notes or implied in the riser are hereby superseded by this requirement.

1.02 WORK INCLUDED

- A. The work covered by this Section of the Specification shall include all labor, equipment, materials and services to furnish and install a complete fire alarm system of the addressable, non-coded type. It shall be complete with all necessary hardware, software and memory specifically tailored for this installation. It shall be possible to permanently modify the software on site by using a plug-in programmer. The system shall consist of, but not be limited to, the following:
 - 1. Fire Alarm Control Panel and related Smoke Purge Panel.
 - 2. Remote Annunciator with semi flush backbox.
 - 3. Addressable manual fire alarm stations.
 - 4. Addressable analog area smoke detectors.
 - 5. Addressable analog duct smoke detectors.
 - 6. Addressable analog heat detectors.
 - 7. Addressable Smoke/CO sensors with integral Temporal 3 (Fire) and Temporal 4 (CO) audible alarms.
 - 8. Audible notification appliances - Horns.
 - 9. Visual notification appliances - strobes.
 - 10. Central station alarm connection control.
 - 11. Air handling systems shutdown control.
 - 12. Pre-Action Sprinkler System.
 - 13. Sprinkler supervisory switches and tamper switch supervision.
 - 14. Battery standby.
 - 15. Kitchen Ansul System Monitoring
 - 16. ALL NYC Fire Alarm peripherals, such as placards, riser diagram, necessary switches, LED's, manual central office trip, Fuse Disconnect, City of NY approved locks, with enclosed Purge switches shall be included in the system price.

1.03 APPLICABLE CODES AND STANDARDS

- A. All equipment shall be UL listed for its intended use and conform to the latest UL Standards.

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PART 3 .00 - EXECUTION

3.01 INSTALLATION

- A. Install Television Distribution Cabling System as described herein and as shown on the Drawings.
- B. Cables shall be run in continuous lengths. Splices shall not be permitted in any conduit run, pull box or device box. Cables shall be installed to avoid sharp bends or physical distortion.

3.02 FINAL TEST PROCEDURE

- A. All tests shall be coordinated with and performed in the presence of the Commissioner.
- B. All equipment needed for final tests and demonstrations shall be supplied by the Contractor at no additional cost to the City of New York.

END OF SECTION

2.02 PRODUCTS

A. TV Outlets

1. The Contractor shall provide a TV Outlet at designated locations where shown on the Drawings.
2. A TV outlet shall consist of one (1) RG-6 cable (#18 AWG) terminated in a F-connector, AMP P/N 5-1814822-3 for single jack or approved equal.
3. Provide faceplate with integrated connector to accept input cable as required. Faceplate shall be plastic in a color selected by the Commissioner, with color-matched screws. Unit shall be AMP P/N 558088 with F-coupler, 2 GHz P/N 1499855, suitable for mounting on a single device box or approved equal.

B. Wiring

All wiring for this system shall meet the following specifications:

1. Cable: The coaxial cables from the Telecommunication Room to the end of the receiver' outlet shall be RG-6 coaxial. Center conductor shall be solid copper, .040" diameter. The RG-6 cable shall be #18 AWG solid, with a cellular polyethylene insulation and a black, vinyl jacket and 100% duo-foil/drain shield. The cable shall be swept from 5 MHz to 3 GHz with maximum attenuation of 5.9 dB/100ft@1 GHz. RG-6 cable shall be BELDEN P/N: 1694A for PVC jacket or BELDEN P/N: 1695A for plenum or approved equal. The plenum grade CMP cable shall be used in environmental air spaces, including plenum ceiling.
2. The cable shall be manufactured within the nine months' period preceding installation. Submit sample for approval. All coaxial cables shall have a nominal characteristic impedance of 75 ohms throughout the entire frequency spectrum utilized in this system. Each reel of cable shall be sweep-tested by the manufacturer and meet the requirements of applicable MIL Specifications.

- C. Cables shall be tagged in all boxes and panels of this system. Tags shall be white with black lettering giving designation.

SECTION 27 1510 - TELEVISION CABLING SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
 - 1. The Contractor shall provide a Television Cabling System, which shall deliver television signal from television broadcast stations received on standard Cable TV feed.
- C. See Section 01 9113 for General Commissioning Requirements.
- D. The Contractor shall provide all materials, equipment, labor and services required for the complete installation of a Television Cabling System.
- E. The system shall distribute the signals of the TV broadcast service to designated television outlets over standard coaxial cable.
- F. The TV system shall consist of a coaxial cable feed from the local Cable Network System that shall bring the basic service of that system into the building for distribution to outlets as herein specified. The Cable TV signals shall be distributed via RG-6 cables.

1.02 SUPPLEMENTAL SUBMITTALS

- A. Complete Cabling system layout Drawings. Each cable run shall be labeled as to its function and room number.

1.03 QUALITY ASSURANCE

- A. All equipment including wiring, cabling, and outlets furnished shall be warranted by the manufacturer for a period of two years from the date of final acceptance thereof against all electrical or mechanical defects or failures.

1.04 GUARANTEE

- A. The Contractor shall submit a certified statement that he guarantees the system for one (1) years after date of acceptance.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

- A. Following are acceptable equipment manufacturers:
Wiring System: Berk-Tek, Belden, or approved equal.

- g. Equal Level Far End Cross Talk or ELFEXT: Sweep and Measure each cable for a minimum ELFEXT according to TIA specifications from 1 Mhz to 250 Mhz. Limit will not be greater than -29.9db at 250 MHz.
 - h. PowerSum Near End Cross Talk or PSNEXT: Sweep and Measure each cable for a minimum PSNEXT according to TIA specifications from 1 MHz to 250 Mhz. Limit will not be greater than -49.2 db at 250 MHz.
 - i. PowerSum Elfext or PSELFEXT: Sweep and measure each cable for a minimum PSELFEXT according to TIA specifications from 1 MHz to 250 Mhz. Limit will not be greater than -42.6 db at 250 MHz.
- E. All test results shall be provided in the following formats:
- 1. On paper.
 - 2. Electronic format.
The test equipment specified has the ability to record test results to electronic memory for viewing and printing later utilizing free Microtest ScanLink software. Submitting electronic test results is preferred in lieu of handwritten forms. In no instance will test data be accepted in a spreadsheet or text based reporting software. This information shall be maintained as a permanent record for the purposes of maintenance and restorations.
- F. All tests shall be coordinated with and performed in the presence of the Commissioner. Any defects or deficiencies discovered in any of the cabling system work shall be indicated on the test report and be corrected.
- G. Upon completion of testing and problem resolution, all cables tested are to be 100% error free.

END OF SECTION

- B. When running cable through dropped ceiling space, the Contractor shall assure proper cable strain relief at all times.
- C. Cable shall be installed so that there are no bends less than four times the cable's outside diameter (4X Cable O.D.) at any point in the run.
- D. Horizontal distribution cables shall not be bundled in groups of greater than 40 cables. Cable bundle quantities in excess of 40 may cause deformation of the bottom cables within the bundle.
- E. Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable.

3.03 LABELING OF CABLES AND JACKS

- A. Cables are to be tagged at both station and closet ends with an alpha and four-digit number beginning with D001 and increasing in increment of 1. It shall be a sticky tag, wrapped and secured to the cable behind both the jack faceplate and patch panel.
- B. All cable and termination labels are unique identifiers, which shall be permanent and comply with TIA/EIA 606 labeling standards. At the closet end the cable will be labeled with two points of information:
 - 1. Room number at the other end of the cable
 - 2. Cable number (four digits)
- C. At the station side, the jack faceplate is labeled with two points of information pertinent to the cable far end and each separated by a dash:
 - 1. Room number
 - 2. Cable number on the jack faceplate (four digits)

3.04 TESTING

- A. All tests are to be performed after installation of the complete system.
- B. The equipment indicated below represents test equipment utilized to develop this test specification. Substitute test equipment may be used only upon approval by the Commissioner provided the same level and quality of testing is performed.
- C. Test Equipment:
 - 1. FLUKE NETWORK OMNISCANNER II, or approved equal of Viavi or Ideal Industries.
- D. Tests to be performed:
 - 1. The test equipment shall be configured to test the maximum transmission performance for which the cable is rated (i.e. for category 6 cable is 1 to 250 Megahertz per second)
 - 2. In accordance with TIA Standards for Category 6 (Full Duplex Parallel Transmission) cabling, the following minimum test information shall be provided for each permanent link:
 - a. Wiremap: Verify Continuity on all 8 conductors and assure no opens, crosses, splits or shorts to another conductor or ground. When applicable, report continuity of shield on screen twisted pair.
 - b. Length: Total length from main closet to workstation termination: The cable length shall conform to the maximum distance set forth in the TIA/EIA 568-A-5 standard (i.e. 90 M or 308 feet).
 - c. Propagation Delay and Delay Skew: Will be measured and reported. Propagation Delay will not exceed 536 nanoseconds and Delay Skew will be within 45 nanoseconds between the fastest and slowest conductor pairs.
 - d. Near End Cross Talk (NEXT) or Noise: Sweep and Measure (1 MHz to 250 MHz) each pair combination. Limits will not be less than 48 db at 250 Mhz. on any combination.
 - e. Attenuation: (db loss): Sweep and Measure each cable for proper attenuation according to TIA specifications at 1 MHz to 250 Mhz. Limit will not be less then +17.5db at 250 MHz.
 - f. Return Loss or Echo: Sweep and Measure each cable for minimum return loss according to TIA specifications from 1 MHz to 250 Mhz. Limit will not be greater then -27.7 db at 250 MHz.

NEXT (Near End Cross Talk) - 48 db minimum tolerance
ACR (Attenuation to Cross Talk Ratio) - 17.5 db at 90 meter
The following color code shall be utilized:

<u>COLOR CODE</u>	<u>PAIR NO.</u>
White/Blue and Blue/White	1
White/Orange and Orange/White	2
White/Green and Green/White	3
White/Brown and Brown/White	4

2. Faceplate:
Provide faceplate with integrated connector and modular jacks to accept input cable and provide combination jacks as required. Faceplate shall be plastic in a color selected by the Commissioner, with color-matched screws. Unit shall be AMP/TYCO P/N 557505, Panduit P/N CFPL2EI Hubbell Premise Wiring IFP Series Faceplates, or approved equal suitable for mounting on a single device box.
3. Telephone/Data Jack:
Telephone/Data jack shall be Category 6 modular eight-pin connector, EIA T568B wiring, UL listed, AMP P/N 1375055-1, Hubbell Premise Wiring P/N HXJ5EWH, Panduit P/N CJ5E88TGWH or approved equal for single jack.
4. Labels:
 - a. Provide laser Printable labels on all cables detailing cable run number. Identification shall be by means of wrap around Hubbell Premise Wiring P/N XPLCBLA2 adhesive cable labels produced via AMP/TYCO Labeling Software AMPNETCONNECT.COM/LABEL, Hubbell Premise Wiring Labeling Software and a standard laser printer. All station outlets, must be labeled and all circuits clearly identified utilizing designation strips in compliance with TIA/EIA 606 standards.
 - b. Labels for risers, cables, faceplates, cover plates etc. shall be provided with textual descriptions.
5. Cable Ties: All cable Ties used to support telecommunications cabling shall be fire-resistant Velcro type. Cable Ties to be installed by Panduit GTS Cable Tie Tool. The support rating of the cable ties used shall be a minimum of twice that of the weight per unit of the cables to be supported. Cable ties shall be deployed every four (4) feet minimum data cables in horizontal runs and two (2) feet minimum when fastening cables vertically on wall.

PART 3.00 - EXECUTION

3.01 INSTALLATION

- A. Workstation Cabling:
 1. Workstation outlets may be described as one of the following:
 - a. Voice and data outlet (6 jack)
 2. A voice and data workstation outlet shall consist of the following cabling:
 - a. One (1) Category Cat 6 augmented plenum rated cable for voice (4 pair twisted, #24 AWG).
 - b. Three (3) Category 6 augmented plenum rated cable for data (4 pair twisted, #24 AWG).
 - c. Two blanks.

3.02 HORIZONTAL DISTRIBUTION CABLE INSTALLATION

- A. Maintain the twist of horizontal and backbone cables to within 0.5" at the point of termination.

SECTION 27 1500 - TELEPHONE/DATA CABLING SYSTEM

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- C. See Section 01 9113 for General Commissioning Requirements.

1.02 SUPPLEMENTAL SUBMITTALS

- A. Product Data:
 - 1. Catalog sheets, factory assembly drawings, specifications and installations for all products. Documents will not be accepted for review unless they are submitted as a package where they pertain to related items, and clearly identified or highlighted to indicate all items that are applicable.
- B. Certificate of compliance with the Quality Assurance and Maintenance requirements.
- C. Certified Test Report

1.03 CABLE DELIVERY

- A. No cable over one (1) year old when delivered to the site will be accepted.

1.04 QUALITY ASSURANCE

- A. Installer's Qualifications:

The firm installing the work of this section shall have a minimum of two-(2) year's experience in Data Cabling System.

PART 2.00 - PRODUCT

2.01 MANUFACTURERS

- A. Acceptable cable manufacturers are AMP/TYCO, Belden, Mohawk, Berk-Tek, Hubbell Premise Wiring, Panduit and General Cable.
 - 1. Category 6 cable:

Cable shall be four, 4 pair Category 6 augmented, 24 AWG plenum rated cable with colored PVC jacket, cable jacketing shall be lead-free, AMP/TYCO P/N 219567-1. The cable shall meet the following performance requirements in addition to other standard Cat 6 performance requirements.

Frequency	- 250 MHz
Max. Attenuation	- 30.5 db/100 meter

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3.06 SYSTEM DOCUMENTATION

A. System Manual

1. Upon final approval of all submittal documentation and shop drawings, the PV system provider shall compile and assemble, with the equipment manufacturer's assistance, a complete system manual consisting of: operating and maintenance instructions, manufacturer's catalog pages of all equipment and components, all as-built wiring and conduit diagrams (both floor plan and riser types) and a manufacturer's suggested spare parts list. The PV system provider shall provide one (1) copy to the Commissioner for approval.
2. Upon approval of the system manual, the PV system provider shall provide and turn over to the City of New York six (6) copies of the approved system manual.

3.07 INSTRUCTION OF PERSONNEL

- A. In addition to the above system manuals, the PV system installer shall provide the services of a trained technical representative for two (2) periods of four (4) hours each, during normal business hours, to instruct the City of New York's designated personnel on the operation and maintenance of the system.

3.08 GUARANTEE

- A. The PV system provider shall directly guarantee all system components, parts and assemblies to be free from inherent mechanical or electrical defects and against defects in workmanship for a period of one (1) year from the date of final acceptance by the City of New York and Con Edison. As required, repair service and replacement parts shall be performed and provided during normal working hours, at no cost to the City of New York, for the one (1) year guarantee period, unless damage is caused by misuse, abuse or accident.
- B. The photovoltaic panels including integral inverters shall be covered by the manufacturer's limited warranty for a minimum of 25 years.

END OF SECTION

- d. In conformance with the New York City and National Electrical Code standards.
 - e. THWN/THHN insulated for wire conductor sizes of 12 A.W.G. and physically larger; TFFN/TFN insulated for wire conductor sizes of 14 A.W.G. and physically smaller.
 - 2. All wires shall test free from grounds and crosses between conductors.
- D. Conduit and Raceways
 - 1. All wiring shall be installed in dedicated conduit (3/4" minimum) throughout.
 - 2. All penetrations of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes.
 - 3. See Architectural drawing roof penetration details.
- 3.03 GROUNDING
 - A. Grounding shall be in accordance with the New York City Electrical Code and these specifications.
 - B. Provide separate equipment ground wire to PV array support structure and frame.
 - C. Follow manufacturer installation instructions for grounding PV modules and PV rack.
- 3.04 CLEAN UP
 - A. Upon completion of the installation, all debris created by the installation shall be removed from the premises or disposed of as directed by the City of New York.
- 3.05 TESTS
 - A. Regardless of the tests required by Con Edison and other authorities having jurisdiction. The PV system provider and a trained manufacturer's technical representative shall test the PV system for proper operation. The system shall be demonstrated to perform all functions. Any system, equipment or wiring failures discovered during said test shall be repaired or replaced before requesting scheduling of the final acceptance test.
 - B. Test Reports: Submit reports of manufacturers field testing and final acceptance test to the Commissioner.
 - C. Upon successful completion of all final acceptance tests, the PV system provider and Manufacturer's representatives shall each author and sign a letter confirming the successful completion of testing. Two (2) copies of each letter shall be forwarded to the City of New York, the local Code enforcement official and Con Edison.
 - D. All final acceptance testing shall be done at a time convenient to the local Code enforcement official, Con Edison and the City of New York and all testing costs shall be born by the PV system provider as part of this Contract.

2.02 COMMUNICATIONS GATEWAY

- A. Provide Gateway communication device to facilitate internal communication with inverters and external wireless communication.
- B. Internal Communication shall be via Broadband Power Line Communication (IEEE 10901) with 15 minute sample rate and maximum node, equal to not less than number of panels.
- C. External Communication shall be wireless, IEEE 802.11 b/g/n compatible W-LAN, local.
- D. Gateway shall be listed to UL 60950-1, FCC Part 15 Class B.
- E. Gateway shall be Ener Box by LG, or approved equal of Solar BOS or Synapse.

2.03 A.C. JUNCTION BOX

- A. Provide waterproof A.C. junction box (NEMA 3R) with copper details to connect array of PV AC modules to A.C. feeder. A.C. feeder shall be run to switchboard MDS as indicated on drawings.

PART 3.00 – EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

- A. The PV system provider shall receive and store all material and equipment necessary to the completion of the Project.
- B. Store equipment in a clean, dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Handle equipment carefully to prevent damage, breaking, and scoring. Do not install damaged equipment or components; replace with new.

3.02 INSTALLATION

- A. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's installation instructions and wiring diagrams. The PV system provider shall furnish all conduit, installation instructions and wiring, outlet boxes, junction boxes, cabinets, disconnect switches and similar devices necessary for the complete installation. System shall be installed in accordance with Article 690 of the 2008 NEC as modified by New York City. PV modules shall be installed, facing within 10 degrees of solar south at a 10 degree tilt angle on a structural frame. Structure frame provided by others. The PV installation contractor shall review structural frame shop drawings and coordinate with requirements for mounting the approved PV modules.
- B. Manufacturers Instructions
 - 1. In addition to the requirements of these Specifications, comply with manufacturers instructions and recommendations for all phases of the Work.
- C. Wiring
 - 1. All wiring shall be:
 - a. Of the size and configuration type recommended by the manufacturer for each type of circuit in the system and meet the requirements below listed in b. through e.
 - b. Copper conductors only. Aluminum conductors or copper clad, plated or coated aluminum conductors shall not be acceptable.
 - c. Color coded throughout.

4. Section 331000 - Water Utilities
5. Section 333000 - Sanitary and Storm Sewerage Utilities

1.11 REFERENCE STANDARDS

- A. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. The latest edition, as of the date of the executed construction contract, of referenced standards listed below applies to this contract.
 1. The National Electric Code, Latest Edition
 2. Consolidated Edison Company of N.Y., Inc. - Details & Specifications

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. Bedding and Backfill: Sand Bedding Material as specified on Sections 310000.

2.02 CONDUIT, FITTINGS AND CABLE

- A. Telephone/Data, Cable: Refer to Division 26 Technical Specifications and the Contract Drawings.
- B. Natural Gas: All piping, valves and appurtenances shall be supplied by the utility company.
- C. Electric: Refer to Consolidated Edison Details & Specifications.

2.03 STRUCTURES

- A. Manholes, pull boxes, and junction boxes shall comply with all requirements, specifications, details, and recommendations of the governing utility company or authority and as indicated on the Contract Drawings.

2.04 CONCRETE MATERIALS

- A. Concrete for encasement of electric, data, telephone/data, and cable duct banks shall be 4,000 psi concrete in accordance with specifications of utility provider.
- B. Concrete for construction of electrical manholes shall be 5,000 psi concrete conforming to Consolidated Edison Specifications.

2.05 RELATED MATERIALS

- A. Warning Tape
 1. Provide plastic-encased aluminum warning tape above utility along entire route.

2. Provide one strip of warning tape per 12-inch encasement width, or portion thereof.
 3. Warning tape shall read "CAUTION - ←UTILITY TYPE→ CABLE BELOW"
 - B. Concrete Pigment
 1. Top of encasement shall be dyed to match the corresponding color as dictated by the American Public Works Association Uniform Color Code.
 2. Dye shall be applied by mixing powdered pigment into top of concrete encasement.
- 2.06 The manufacturer providing the materials or equipment specified in Part 2 must, for the past five (5) years have been regularly engaged in the manufacturing of the 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions.
- B. Verify building service connection points with architectural plans, and mechanical, electrical, and plumbing plans.

3.02 PREPARATION

- A. Conduit
 1. Remove scale and dirt, on inside and outside of conduit, prior to assembly.
 2. Prepare conduit in accordance with manufacturer's recommendations.

3.03 BEDDING

- A. Excavate all utility trenches and place bedding in accordance with Section 310000 and Contract Drawings.

3.04 INSTALLATION - CONDUIT

- A. Maintain minimum conduit separation in accordance with state and/or local code.
- B. Place forms for concrete encased duct banks. Install conduit to conserve space and to allow for expansion and contraction without stressing conduit or joints. Pour concrete and vibrate to ensure there are no voids. Dye top of encasement in accordance with specification requirements.
- C. Backfill trench in accordance with Section 310000. Install warning tape in accordance with specification requirements.
- D. Install conduit in the line and grade indicated on the Construction Drawings. Contractor shall reference the Electrical, Mechanical, Telecom, and Site Utility Drawings to ensure sufficient conduit capacity to pull the necessary electric and telecommunication wires.

- E. Construct service lines to within 5 feet of the exterior building wall at the building entry point unless otherwise indicated on the Construction Drawings. Cap ends of conduits, or connect to building system as directed by Commissioner. Mark to adequately identify type of utility.

3.05 INSTALLATION - STRUCTURES

- A. Install manholes, handholes, junction boxes and/or pull boxes in accordance with all requirements, specifications, and recommendations of the governing utility company or authority, and as indicated on Construction Drawings.

3.06 DAMAGE

- A. Any product, which is damaged or disturbed through any cause prior to acceptance of the Work, shall be repaired, realigned, or replaced as directed by the Commissioner, at no expense to the City of New York.

3.07 FIELD QUALITY CONTROL

- A. Upon completion of the work of this and related sections, the contractor shall provide the Commissioner with an as-built survey of all new fence and posts. The survey shall be provided in digital (AutoCAD DWG) and paper formats, and shall be signed and sealed by a New York State Licensed Professional Land Surveyor. This survey may be combined with other as-built survey requirements of site work items, with the approval of the Commissioner.

END OF SECTION

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SECTION 33 1000 - WATER UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Work of this section, as shown or specified, shall provide Water Utilities in accordance with the requirements of the Contract Documents. The Contractor must accept the site as-is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.

1.02 WORK INCLUDED

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, certificate costs, services, filing fees, testing costs, security, and all other associated or related items specified herein that are necessary and are required to complete the Work. Work elements shall include:
 - 1. Furnish labor, materials, services, equipment, and other necessary items required for accompanying the construction of the water systems. This shall include, but not be limited to the following: pipe and fittings for site water line including domestic water line and fire water line, valves, and flexible connections. Set lines, elevations, and grades for water distribution system work for duration of work including careful protection of benchmarks, property corners, monuments, or other reference points.

1.03 SUBMITTALS

- A. No work shall be performed until shop drawings, if required, have been reviewed and accepted by the Commissioner.
- B. The Contractor must provide the following submittals to the Commissioner for approval prior to purchase of materials:
 - 1. Material Certificates: Submit materials certificate to the Commissioner which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein and applicable regulatory requirements.
 - 2. Product Warranty: Submit documentation of standard product warranty terms for all products pertaining to this section.
 - 3. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.
 - 4. Manufacturer's Certificate: Certify that products meet or exceed state and local requirements.
- C. Accurately record actual locations of pipe runs, connections, structures, valves, and invert elevations. The Contractor shall provide the Commissioner with as-built documents within 30 days of project completion.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with the NYC Department of Environmental Protection and New York City requirements.

- B. Manufacturer's name and pressure rating must be marked on valve body.

1.05 CONTRACTOR'S RESPONSIBILITIES

- A. Retain an independent testing agency to perform material testing as required. The Contractor shall provide any necessary assistance to the testing agency and provide the testing agency with the intended construction schedule at least one week prior to the start of construction.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Contractor is responsible for coordinating this work with other trades on-site.
- B. All work must be coordinated with the electric, gas, telephone/data, and cable utility companies and shall comply with all requirements, details, regulations, etc. of said companies
- C. Identify and describe unexpected variations to subsoil conditions and the discovery of uncharted utilities.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials as recommended by the manufacturer to protect from damage.

1.08 PERMITS AND APPROVALS

- A. Contractor shall prepare and obtain all required permits prior to construction unless otherwise directed by Commissioner. Copies of all permits shall be supplied to the Commissioner prior to the commencement of work authorized by the permit. Complete work as per approved New York City Department of Environmental Protection certified Cross Connection Application.
- B. Connections with existing facilities shall be performed in accordance with the requirements of the Owner of the facility. The Contractor shall be required to comply with all such requirements, including securing all permits, and payment of all permit and/or connection fees.

1.09 PROJECT RECORD DOCUMENTS

- A. Upon completion of the work of this and related sections, the contractor shall provide the Commissioner with an as-built survey of all new water, sewer, electric and gas service lines. The data shall include elevations for all new utilities and locations tied into established project benchmarks. The survey shall be provided in digital (AutoCAD DWG) and paper formats, and shall be signed and sealed by a New York State Licensed Professional Land Surveyor. This survey may be combined with other as-built survey requirements of site-work items, with the approval of the Commissioner. Marked-up design plans are not acceptable for the requirements of this section. All survey elevations shall be in North American Vertical Datum (NAVD88).

1.10 RELATED SECTIONS AND DOCUMENTS

- A. Project Specifications:
 - 1. Section 020110 - Protection of Existing Conditions

2. Section 021000 - Protection of Existing Utilities
- B. RCNY Title 15 Chapter 20 Rules Governing and Restricting the Use and Supply of Water.
- C. New York City Building Code
- D. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.11 REFERENCE STANDARDS

- A. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. The latest edition, as of the date of the executed construction contract, of referenced standards listed below applies to this contract.
 1. American Society for Testing Materials (ASTM), American National Standards Institute (ANSI), and American Water Works Association (AWWA)
 - a. ANSI/ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - b. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - c. ASTM B88 - Seamless Copper Water Tube.
 - d. ANSI/AWS A5.8 - Brazing Filler Metal.
 - e. ANSI/AWWA C104 - Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
 - f. ANSI/AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
 - g. ANSI/AWWA C111 - Rubber-Gasket Joints for Ductile Iron and Grey Iron Pressure Pipe and Fittings.
 - h. ANSI/AWWA C151 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water or Other Liquids
 - i) ANSI/AWWA C500 - Gate Valves, 3 through 48 inches NPS, for Water and Sewage Systems.
 - ii) ANSI/AWWA C504 - Rubber Seated Butterfly Valves.
 - i. ANSI/AWWA C508 - Swing Check Valves for Waterworks Service, 2 inches through 24 inches NPS.
 - j. ANSI/AWWA C509 - Resilient Seated Gate Valves 3 inches through 12 inches NPS, for Water and Sewage Systems.
 - k. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Appurtenances.
 - l. ANSI/AWWA C606 - Grooved and Shouldered Type Joints.
 2. New York City Department of Environmental Protection Bureau of Water and Sewer Rules, Standard Details, and Specifications.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. As required by NYC DEP for water main and building service lateral work.

2.02 GEOTEXTILES AND GEODRID MATERIALS

- A. As required by NYC DEP for water main and building service lateral work.

2.03 WATER PIPE MATERIALS AND ACCESSORIES

- A. Ductile Iron Pipe: Cement-Lined, ANSI A21.10 (AWWA C151) Class 56 for pipe 6 inch diameter and larger; Class 52 for smaller than 6 inch diameter:
 - 1. Fittings: Ductile iron, standard thickness.
 - 2. Joints: AWWA C151, mechanical joints.
 - 3. Cement mortar lining: AWWA C104.
 - 4. Retainer glands: EBBA Series 100 or approved equal.
- B. Gate Valves - 3 inches (75 mm) and over
 - 1. Manually operated, inside non-rising stem, ductile iron body/bonnet/seal plate, non-packing, bronze seated, double disc, seating wedge mechanism gate valve; model and manufacturer as approved by the NYCDEP Bureau of Water and Sewer.
- C. Meter: Meter shall be per plumbing plans and specifications. Meter make and model shall be filed and approved by the NYCDEP Cross Connection Unit.
- D. Backflow Prevention Device: Backflow prevention device shall be per plumbing plans and specifications. Backflow prevention device make and model shall be filed and approved by the NYCDEP Cross Connection Unit.

2.04 CONCRETE MATERIALS

- A. Concrete for Thrust Blocks: Place thrust blocking consisting of 3,000 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs/sq. ft. when water main pressure is 100 psi.

2.05 PRODUCT SUBSTITUTIONS

- A. All products shall be as approved by NYC DEP. No substitutions will be accepted without prior approval by NYC DEP and Commissioner.

EXECUTION

2.06 EXAMINATION

- A. Verify existing conditions.
- B. Verify building service connection points with architectural and plumbing plans.

- C. Verify that existing water main size, location, and invert are as indicated on the drawings.

2.07 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

2.08 CLEANING

- A. After the system has been cleaned, the Contractor shall thoroughly inspect the system and all repairs shown to be necessary shall be promptly made by the Contractor.
- B. All Work of cleaning and repair as specified herein shall be performed at the Contractor's expense and to the complete satisfaction of the Commissioner.
- C. Disinfection of Water Piping System
 1. Sterilize distribution system with a solution of not less than 50 parts per million of chlorine with water prior to domestic operation. Thoroughly flush lines before introduction of chlorinating materials and after the contact period of at least 24 hours. De-chlorinate water prior to flushing into storm sewer system.
 2. Open and close valves in lines being sterilized several times during contact period. System shall be flushed with clean water until residual chlorine content is less than 1.0 part per million.
 3. After sterilization, test water for bacterium in accordance with AWWA specifications. Do not place distribution system in service until approval is obtained from applicable governing authorities.

2.09 BEDDING

- A. Excavate pipe trench in accordance with Section 310000, and contract drawings.
- B. Form and place concrete for pipe thrust restraints at any change of pipe direction.
- C. Place bedding material at trench bottom.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact in accordance with Section 310000.

2.10 INSTALLATION - PIPE

- A. Maintain separation of water main from sanitary and storm sewer piping in accordance with state and local code. Unless otherwise approved, water mains shall be separated from sanitary sewer pipes a minimum distance of 10 feet horizontal and 18 inches vertical.
- B. Install ductile iron piping and fittings to ANSI/AWWA C600.
- C. Route pipe in straight line.

- D. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- E. Install access fittings to permit disinfection of water system performed under this section.
- F. Slope water pipe and position drains at low points.
- G. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
- H. Establish elevations of buried piping to ensure not less than 4 ft of cover over the top of pipe under proposed grading. Locations where shallow cover cannot be avoided must be brought to the attention of the Commissioner for review.
- I. Backfill trench in accordance with Section 310000.
- J. Coordinate with NYCDEP for new wet tap to existing main. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each on-site wet tap connection under conditions which least interfere with operation of existing pipeline. NYCDEP will provide wet tap to their existing main.

2.11 INSTALLATION - VALVES

- A. Install gate valves as indicated on Drawings, supported on concrete pads with the valve stem vertical. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished grade. Form and place cast-in-place concrete base pad, place precast reinforced concrete pad at the location and elevation specified on the plans.

2.12 INTERFACE WITH EXISTING FACILITIES

- A. Construct water service lines to within 5 feet of the building entry point.

2.13 CONSTRUCTION WITHIN THE PUBLIC R.O.W.

- A. Construction within the public right-of-way shall conform to all requirements of the City of New York, NYCDOT, and any other agency having jurisdiction.

2.14 INSPECTION AND TESTING

- A. Water line installation and testing shall be certified to the NYCBC by a licensed plumber. The Contractor shall cooperate with the Commissioner as required to facilitate testing and inspection of the work.
- B. Test water distribution system installed below grade and outside the building in accordance with NYCBC and the following procedures:
 - 1. All pipework shall be tested at a hydrostatic pressure equal to 150 psi. The pipe work shall maintain said pressure for not less than two hours.
 - 2. Furnish, install, and operate the necessary connections, pumps, meters, and gauges. Leakage shall not exceed that permitted by AWWA Specifications C600-64 for mechanical joint and push-on joint pipe. Prior to running any field test, a meter shall be tested, sealed, and approved by applicable governing authority at Contractor's expense.

3. Locate and repair any leaks. Repeat testing until process results are satisfactory and in compliance with this section.
 4. Furnish a copy of the results of the meter test and the hydrostatic pressure test to the Commissioner upon completion of water distribution system backfilling operations.
- C. Contractor shall call for NYCDEP inspection of all waterline work and shall be responsible for obtaining all NYCDEP signoffs, including but not limited to tap release letters and meter release letters.
- D. All waterline work, including but not limited to meters, taps, and backflow prevention device shall be constructed in accordance with the latest version of RCNY Title 15 Chapter 20 Rules Governing and Restricting the Use and Supply of Water.

END OF SECTION

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SECTION 33 3000 - SANITARY AND STORM SEWERAGE UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide all labor, materials, equipment and services to install all sanitary and storm sewerage utilities as indicated on the Contract Documents.
- B. Section Includes:
 - 1. Furnish and install sanitary and storm sewerage piping, fittings and accessories, and bedding as per the Contract Documents.
 - 2. Furnish and install on-site sanitary and storm manholes and cleanouts as per the Contract Documents.
 - 3. Furnish and install sanitary and storm sewer manholes and connection to New York City Sewers in accordance with New York City Department of Environmental Protection (NYCDEP) Site Connection Certification, as applicable.
 - 4. Furnish and install all sanitary and stormwater manholes and pipes in accordance with New York City Department of Buildings (NYCDOB) requirements.
- C. Related Sections:
 - 1. Section 02 20 50 - Protection of Existing Utilities
 - 2. Section 31 00 00 - Earthwork
 - 3. Section 31 25 00 - Erosion and Sedimentation Control
 - 4. Construction Drawings

1.02 REFERENCES

- A. All work and materials under this section shall conform to the latest revision of the following standard specifications and project documents, where not otherwise required by the Contract Documents:
 - 1. New York City Building Code.
 - 2. NYCDEP Standard Sewer Specifications, latest edition.
 - 3. ANSI C150/AWWA A21.50 - Ductile Iron Pipe (DIP) Class 56, Cement-Lined Tyton Joints.
 - 4. ANSI C151/AWWA A21.51 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
 - 5. ANSI C111/ANSI A21.11 - Rubber Gasket Joint Seals.
 - 6. ASTM A48 - Gray Iron Castings.
 - 7. ANSI/ASTM C14 - Concrete Sewer, Storm Drain and Culvert Pipe.
 - 8. ANSI/ASTM C55 - Concrete Building Brick.
 - 9. ANSI/ASTM C76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 10. ANSI/ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 11. ANSI/ASTM C507 - Reinforce Concrete Elliptical Culvert, Storm Drain and Sewer Pipe.
 - 12. ASTM C478 - Precast Reinforced Concrete Manhole Sections.
 - 13. ASTM C618 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - 14. ASTM C923 - Resilient Connectors between Reinforced Concrete Manhole Structures and

Pipes.

15. ASTM D1248 - Polyethylene Plastics Molding and Extrusion Materials
16. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
17. ASTM D3350 - Polyethylene Plastics Pipe and Fittings Materials
18. ASTM F2306 - Standard Specification for 12 to 60 in. Annular Corrugated Profile-Wall Polyethylene Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications
19. AASHTO M294 and M252 - Corrugated Polyethylene Pipe Smooth Interior.
20. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate locations, elevations, invert elevations, piping, sizes and elevation penetrations of sanitary and storm system piping and all appurtenant structures. Include signed and sealed engineering calculations for loading design of all structures.
- B. Product Data
 1. Pipe: Provide catalog materials indicating pipe, pipe accessories, and fittings.
 2. Manholes: Provide manhole covers, component construction, features, configuration, and dimensions.
 3. Yard Drains.
 4. Trench Drains.
 5. Detention System.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed ANSI/ASTM or AWWA designations.

1.04 COORDINATION

- A. Coordinate building sanitary, storm, and combined sewer connection points with the location shown on the utility plans and connections to internal sewers and NYC Department of Environmental Protection Sewers.

1.05 PERMITS AND APPROVALS

- A. The Contractor shall be responsible for obtaining street opening permit (if required) and all permits and inspections for the sewer system construction as required by the NYCDob and NYCDOT.
- B. Contractor shall perform work as per the NYC DEP certified Site Connection Proposal.

1.06 RELATED DOCUMENTS

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS AND ACCESSORIES

- A. Ductile Iron Pipe:
 - 1. ANSI C150/AWWA A21.50 - Ductile Iron Pipe (DIP) Class 56, Cement-Lined, Joints.
 - 2. ANSI C111/ANSI A21.11 - Rubber Gasket Joint Seals.
 - 3. All pipe shall be in accordance with NYC Building Code, latest revision.
- B. High Density Polyethylene Pipe (HDPE)
 - 1. HDPE pipe shall comply with requirements of AASHTO M252 Type S and AASHTO M294, Type S for 12" through 60" diameter, or ASTM F2306. Fittings shall be watertight and conform to AASHTO M294, AASHTO M252, and ASTM F2306. Joints shall be bell and spigot with an o-ring gasket meeting ASTM F477. Per New York City Environmentally Preferable Purchasing (EPP) Minimum Standards for Construction Products, the HDPE pipes should have 100% recovered post-consumer content and 100% total recovered materials content.
 - a. Postconsumer Recovered Material: A material or finished product that has served its intended use and has been diverted or recovered from waste destined for disposal, having completed its life as a consumer item. Postconsumer material is a part of the broader category of recovered materials.
 - b. Recovered Material: Waste materials and byproducts which have been recovered or diverted from solid waste, but such term does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process.
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- D. Bedding: Refer to Section 31 00 00 - Earthwork.

2.02 PRECAST CONCRETE YARD DRAINS

- A. Precast Concrete Yard Drains: 4,000 psi concrete reinforced for H20 loading in accordance with ASTM C478 of size, shape and depth as indicated on the contract drawings. Class C Fly Ash, in accordance with ASTM C618, shall constitute 40% by mass of total cementitious material used in the concrete mix.
- B. Lid and Frame: Heavy duty cast iron construction with H-20 design loading and ADA compliant.
- C. Hood: Standard cast iron hood and hook.
- D. Steps: Cast iron steps required for yard drain basin depth of 4-ft or greater. Steps shall be 10-inches wide with 5-inch tread per ASTM-48 Class 40 Standards.
- E. Base Pad: Precast reinforced concrete or Cast-in-place concrete 4,000 psi leveled top surface to receive cast iron shaft sections, sleeved to receive sewer pipe sections. Class C Fly Ash, in accordance with ASTM C618, shall constitute 40% by mass of total cementitious material used in the concrete mix.

2.03 TRENCH DRAIN

- A. Frame and grate shall be ADA and H-20 loading compliant and reduce heel hazard.
- B. All drain components shall be product of one manufacturer.
- C. Provide sealant of type recommended by the manufacturer.
- D. Contractor shall install per manufacturer details and specifications, and as detailed on the Construction Drawings.

2.04 CONCRETE MANHOLES

- A. Manhole Sections: Reinforced precast concrete
 - 1. 4,000 psi concrete reinforced for H20 loading or greater in accordance with ASTM C478, with self-sealing butyl gaskets in accordance with ASTM C923. Class C Fly Ash, in accordance with ASTM C618, shall constitute 40% by mass of total cementitious material used in the concrete mix.
 - 2. Construct manholes of precast concrete sections as required by the Contract Drawings to size, shape, and depth indicated.
- B. Mortar and Grout:
 - 1. Conform to the requirements of ASTM C91 for masonry cement used for laying up dimension masonry.
 - 2. Grouting material for use in grouting anchor bolts, franges, dowels and other miscellaneous items in concrete shall be a non-metallic, non-shrink grout which when mixed with water, will harden rapidly to produce a permanent anchoring bond. It shall be free of any corrosion promoting agents.
- C. Reinforcement: Grade 60 deformed steel rebars with galvanized finish. Reinforcing shall conform to the latest revised edition of the AISC code. Steel reinforcing shall contain minimum 25% total recycled content, calculated by adding the post-consumer recycled content plus one-half of the pre-consumer recycled content.
- D. Lid and Frame: Per details shown on plans or approved equal.
- E. Manhole Steps: Cast Iron steps required for manhole depth of 4-ft or greater. Steps shall be 10-inches wide with 5-inch tread per ASTM-48 Class 40 Standards.
- F. Base Pad: Precast reinforced concrete or cast-in-place concrete leveled top surface. Class C Fly Ash, in accordance with ASTM C618, shall constitute 40% by mass of total cementitious material used in the concrete mix.

2.05 CONCRETE MANHOLE CONFIGURATION

- A. Shaft Construction: Concentric with eccentric cone top section; lipped male/female dry joints; sleeve to receive pipe sections.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: 48 inch diameter unless noted otherwise on Contract Drawings.

- D. Design Depth: As indicated on plans.
- E. Clear Lid Opening: 27 inches diameter minimum.
- F. Pipe Entry: Provide openings as indicated.
- G. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls, and point up irregularities and rough edges with nonshrink grout.
- H. Inverts: Shape inverts for smooth flow across structure floor as shown on Drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float. Provide benches in all sanitary and combined sewer manholes.

2.06 PRECAST STORMWATER DETENTION TANK

- A. Precast stormwater detention tank shall be as shown on the Contract Drawings. Manufacturer and model type shall be NYCDEP-approved. Installation per manufacturer's specifications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify the trench cut and excavation base to be firm, smooth, and dry.
- B. Verify excavation location, dimensions and elevation with Contract Drawings.
- C. Verify items provided by other sections of work are properly sized and located.
- D. Verify that built-in items are in proper location, and ready for roughing into Work.
- E. Verify excavation for manholes is to the correct depth and that the bottom is firm and smooth.

3.02 PREPARATION

- A. Set all lines, elevations, and grades for utility work and maintain for the duration of work. Provide careful protection of bench marks, property corners, monuments, or other reference points.
- B. Protect and maintain in operating condition, existing utilities encountered during utility installation. Repair any damage to surface or subsurface improvements shown on the drawings.
- C. Verify location, size, elevation, and other pertinent data required to make connections with existing sewer systems indicated on the Drawings.
- D. Coordinate structure placement with inlet and outlet pipe or duct sleeve locations and inverts required by other sections.
- E. Coordinate all building sewer connection locations and elevations with architectural and plumbing plans. Contractor shall comply with all local codes and regulations.
- F. Hand trim excavations to required elevations.

- G. Install dewatering systems that will be required to construct the proposed utility structures to the design elevations and using the methods described herein. Water pumped out of excavations shall be disposed of on-site for sedimentation removal, and will not be discharged directly to the City's storm drainage system without prior approval from NYCDEP.
- H. Remove large stones or other hard matter, which could damage pipe or impede consistent backfilling or compaction.
- I. Subgrade areas identified by the Commissioner as not being capable of supporting the proposed structure shall be excavated to suitable material or a maximum of two additional feet, backfill with bedding material and compact as specified in Section 31 00 00 - Earthwork.

3.03 BEDDING

- A. Excavate pipe trench and prepare pipe bedding in accordance with Section 31 00 00 - Earthwork.
- B. Place and compact bedding material at trench bottom. Hand trim bedding for accurate placement of pipe to elevations indicated.
- C. Maintain moisture content of bedding material between 1% below and 3% above optimum during compaction.

3.04 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ANSI/ASTM or AWWA requirements and/or manufacturer's instructions. Seal joints watertight.
- B. Lay pipe to slope gradients noted on Construction Drawings; with maximum variation from true slope of 1/8 inch in 20 feet.
- C. Lay pipe beginning at low point of system, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.
- D. Refer to Section 31 00 00 - Earthwork for trenching and backfilling requirements. Do not displace or damage pipe when compacting.
- E. Connect to building sewer outlet, internal sewer, and/or New York City sewer systems (as applicable).

3.05 INSTALLATION - CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for pipe end sections.
- C. Mount lid and frame level in grout, to finished grade elevation indicated on plan.

3.06 INSTALLATION - MANHOLES

- A. Placing Manhole Sections:
 - 1. Place granular base pad, trowel top surface level for cast-in-place bases.

2. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.
3. After completion of excavation, setting of reinforcing steel and placing inlet and outlet pipes, but prior to placing concrete for invert slab, set precast concrete blocks on slab foundation to support first manhole barrel which shall be lowered into excavation, grooved end first, and set on concrete blocks. Align and adjust to proper grade prior to placing invert slab, which shall be poured immediately after setting of first section of manhole barrel.
4. Prior to setting subsequent manhole barrel sections, apply primer to tongue and groove ends and allow primer to set in accordance with manufacturer recommendations. Place gasket on tongue end. Lower next section into position, and remove excess material from interior of structure. Add additional primer on exterior of joint, if necessary, for completely watertight joint.
5. Salvage and reuse castings belonging to reset/converted structures if possible.
6. Set cover frames and covers securely to correct line and grade elevations.
7. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
8. Coordinate with other sections of work to provide correct size, shape, and location.

B. Masonry Construction

1. Maintain masonry courses to a uniform dimension. Form vertical and horizontal joints of uniform thickness.
2. Lay masonry units in running bond.
3. Form flush mortar joints.
4. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
5. Install joint reinforcement 16 inches on center.
6. Place joint reinforcement in first and second horizontal joints above base pad and below lid frame opening.
7. Set cover frames and covers securely to correct line and grade elevations.
8. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
9. Coordinate with other sections of work to provide correct size, shape, and location.

3.07 INTERFACE WITH EXISTING FACILITIES

- A. Requirements: The Contractor shall make all required connections of the proposed sewage facilities into existing facilities, where and as shown on the Construction Drawings, as applicable.
- B. Compliance with Facility Owner Requirements: Connections made into existing facilities shall be performed in accordance with the requirements of the NYCDOB and the NYCDEP. The Contractor will be required to comply with all such requirements, including securing of all required permits, and paying the costs thereof. The cost of making the connections in accordance with the requirements of the Owner of the existing facility shall be included in the Contract Sum.

3.08 CONSTRUCTION WITHIN THE CITY R.O.W.

- A. Construction within the public right-of-way shall conform to all requirements of the City of New York, NYCDOT, and any other agency having jurisdiction.

3.09 MODIFICATIONS OF EXISTING STRUCTURES

- A. General: The Contractor shall alter, reconstruct and/or convert existing structures where and as shown on the Drawings, and/or as approved by the Commissioner. In general, alterations shall be performed with the same type of material used in the original construction unless otherwise indicated on the Drawings or approved by the Commissioner.
- B. Damage to Existing Installations: The Contractor shall exercise extreme care during such alteration, reconstruction and/or conversions so as not to damage any portions of the structure and/or pipe shown to remain. Any such damage shall be repaired by the Contractor at his own expense and to the satisfaction of the Commissioner.

3.10 FIELD QUALITY CONTROL

- A. Backfill placement and quantity control will be performed in accordance with Section 31 00 00 - Earthwork.
- B. Inspection and Testing: As per NYC Building Code, sewer installation and testing shall be certified to the NYCBC by a licensed plumber. Cooperate with the Construction Manager as required to facilitate testing and inspection of the work. Test the complete sewer system, including mains, lateral sewers and manholes for both infiltration and exfiltration. Provide all materials equipment and services as necessary to perform the tests.
- C. Connections of pipe to manholes shall be water tight.
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to City of New York.
- E. Any defective work not meeting contract requirements shall be replaced at Contractor's own expense.

END OF SECTION

SECTION 43 4116 - PETROLEUM BULK STORAGE (PBS) TANK SYSTEMS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section includes all labor, material, and equipment required for providing/installing aboveground PBS Tank Systems.

1.02 RELATED DOCUMENT

- A. SECTION 43 4117 - PBS PRODUCT PIPING
- B. SECTION 43 4118 - PBS INSTRUMENTATION AND CONTROL
- C. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.03 SUBMITTALS

- A. Contractor Shop Drawings submittals shall include, but not be limited to, following:
 - 1. Manufacturer's descriptive, technical literature and catalog cuts, including installation instructions.
 - 2. Manufacturer's warranties.
 - 3. Piping layout drawing.
 - 4. Tanks and appurtenances.
 - 5. Catalog cuts, as appropriate.
 - 6. Any deviations from Contract Drawings because of physical interferences, substitutions, or field verifications shall be clearly indicated on shop drawings.
- B. Submit the following closure documents as applicable at project completion. Contractor shall not receive final payment until all close out documents are submitted.
 - 1. PBS Applications
 - 2. NYCDOB completion letter
 - 3. FDNY BFP A-111 letter of completion
 - 4. FDNY BFP Storage Use Permit, if required
 - 5. NYCBECE (Bureau of Electrical Control) Certificate of Electrical Completion
 - 6. As-Built Drawings prepared per 6NYCRR Part 613
 - 7. NYSDEC PBS Certificate
 - 8. Manufacturer's warranties

1.04 GENERAL TESTING AND RESPONSIBILITY

- A. Installation of tanks and equipment for the petroleum storage systems shall be performed by a Contractor who shall be FDNY Bureau of Fire Prevention-certified, New York City Licensed Installer for storage tank systems.

- B. All fill caps shall have sign that labels type of product stored in tank. Signs to be per API color-coding for the product stored in the tank.
- C. Below grade spill containment fill box shall have a capacity of 15 gallons. Each spill containment box shall be double walled construction provided with a discriminating interstitial leak sensor, an automatic drain, test plug assembly, watertight and lockable cap, bronze adapter, No. 20-mesh brass screen, and grounding rod.
- D. Each spill containment manhole shall have cover permanently marked according to tank contents and painted to conform with the American Petroleum Institute Color and Symbol Code and NYSDEC and USEPA requirements.

2.03 DIRECT READ TANK GAUGE

- A. Provide and install new direct read tank gauge as shown on Contract drawings.
- B. Direct read tank gauge shall be completely compatible with fluid to be stored in tank.
- C. Direct read tank gauge shall be a clock-type mechanical gauge, or approved equal.

2.04 FUEL DISPENSERS

- A. Each dispenser shall consist of a single fuel dispensing system, with all components certified by the manufacturer to be compatible with biodiesel (B5 and B20). Each dispenser shall be Gasboy Series 9100 or approved equal with cc option, 10-1 wheel pulser, and solenoid, as manufactured by Gasboy International, Inc. and distributed by Source North America of West Babylon, NY, Henrich Equipment Company of West Babylon, NY, Walters West End Supply of Lindenhurst, NY, or approved equal. Each dispenser shall include but not be limited to following:
 - 1. Register: Non-computer, mechanical type register with power reset interlock that is displayed on both front and back, reading in gallons up to 999.9
 - 2. Totalizer: Non-resettable totalizer that is displayed on front, reading in gallons up to 999,999.9 and rolls over
 - 3. Pump: Gear-type pumping unit with built-in air eliminator. Pump shall be driven by 3/4 hp, 115/230 volt, 60 Hz AC motor
 - 4. Meter: Three piston, positive displacement-type meter, tested and calibrated for accuracy at any speed or pressure
 - 5. Product hose and spring retractable hose reel: 3/4 inch by 25 foot long hose (note: hose length requires FDNY BFP variance)
 - 6. Nozzle: 3/4" Nozzle rated for B5 and B20 Biodiesel
 - 7. Cabinet: All stainless steel
 - 8. Filter: 25 GPM, 10 micron filter, for particulates and water
 - 9. Brand panel: Brand panel shall read type of fuel being dispensed
 - 10. Fuel island: Size as indicated on Contract Drawings: Steel island form as manufactured by Formex Permanent Steel Forms, OPW, Universal Valve Company, or approved equal
 - 11. Manual hand crank: Gasboy Kit No. 032048 ("K option") or approved equal
 - 12. Double walled under-dispenser spill containment sump with discriminating primary containment and interstitial space leak sensors.

2.05 EMERGENCY SHUTOFF SWITCH

- A. Emergency pump shut-off switches shall be installed for each pump as shown on Contract Drawings. Switches shall be of a type that must be reset manually.
- B. Emergency pump shut-off switch shall be configured to activate an audible alarm in the fuel dispensing area and at the fuel system monitoring console per NYC Fire Code Section 2204.1.2.

2.06 TANK SYSTEM IDENTIFICATION

- A. Mount permanent stencils, labels, or plates on tanks, fill ports and equipment. Include following information:
 - 1. Manufacturer's statement that tank conforms with Bulk Storage Regulation 6 NYCRR Part 614
 - 2. Standard of design by which tank was manufactured
 - 3. List of products and additives which may be permanently stored in tank
 - 4. Year tank was manufactured
 - 5. Unique identification number
 - 6. Dimensions, design, working capacity and tank model number
 - 7. Name of tank manufacturer
 - 8. Date of installation
 - 9. C of A Label for each dispenser, fill box and leak detection/inventory control system

2.07 SIGNS

- A. Supply and install all signs required by New York City Fire Code including:
 - 1. "Caution: When Alarm Sounds, Tank Filled To Capacity. Do Not Overfill" adjacent to overfill alarm.
 - 2. "No Smoking While Refueling" adjacent to, or on, fuel dispensing island.
 - 3. "Shut Off Engine While Refueling" adjacent to, or on, fuel dispensing island.
 - 4. "Emergency Shut-Off Switch" adjacent to fuel dispensing shut-off switch.

2.08 THREADS

- A. Threads for threaded fittings shall be American Standard Taper Pipe Thread, in accordance with ANSI B-2.1.

2.09 FITTINGS

- A. All product fittings shall be heavy duty steel threaded flanges (NPT) or raised-face-slip-on weld flanges (RFSO).
- B. Threaded cast iron fittings shall comply with ANSI B-16.4
- C. Steel welded fittings shall be of same weight as piping in which used and comply with ANSI B-16.9 and ASTM A-234
- D. Threaded malleable iron fittings shall be banded type ANSI B-16.3 for standard weight, and ANSI B-16.9 for extra heavy weight

2.10 TESTING REQUIREMENTS

- A. Hydrostatically test tanks at 20 psi, in accordance with New York City requirements
- B. Test tank and piping after erection of piping but prior to final connection
- C. Commissioner reserves right to approve all tests
- D. Repair any leaks or defects detected during testing and retesting
- E. All tests and retests shall be conducted in presence of Commissioner
- F. Commissioner may require tests when installation, or any part thereof, is complete. Contractor shall furnish all necessary labor and equipment for testing. If installation fails test, Contractor shall take all necessary corrective actions and retest to satisfaction of Commissioner

2.11 OPERATIONS & SERVICE MANUALS

- A. Contractor shall provide three (3) operations and service manuals in 3 ring vinyl binders incorporating all manufacturer's information describing operations and service schedules for the system installed. Operations and service manuals shall include wiring diagrams, detailed equipment list and spare parts required.

2.12 NYSDEC FILING

- A. Contractor shall be responsible for all required NYSDEC filings for the tank system
- B. Upon 100% completion of any PBS tank work (including signage and labeling), register the tank as applicable by submitting PBS Application to NYSDEC (copy to FD/Facilities) and pay all required fees. Any violations and/or penalties for PBS non-compliance will be the financial responsibility of the installer

PART 3 EXECUTION

3.01 GENERAL

- A. Protect site in a neat and workmanlike manner. Remove debris, dirt, rubbish, etc. from site at end of each day.
- B. Contractor is responsible for verifying all dimensions in field and for insuring that interferences do not exist between Contractor's work and that of surrounding work.
- C. Initiate a safety program to prevent injury to residents, employees and visitors. Do not block streets or exits.
- D. Provide and protect any structures or lighting and take all measures required by law for protection of public.
- E. Perform contract work so that no injury or damage will occur to public, structures and property including streets, paving, monitoring wells, recovery wells, sewers, water, electric or any other pipes,

mains, conduits. Should any damage or injury be caused by Contractor or anyone in his employ, or by improper or defective workmanship under this contract, Contractor shall repair such damage and assume all responsibility for such injury without cost to the City of New York.

- F. At excavations, provide barriers on same day that excavation is made and check barrier integrity daily so that protection is provided at all times.

3.02 INSTALLATION

- A. Equipment installed by Contractor shall be in accordance with manufacturer's instructions and applicable codes and regulations.

3.03 TESTING

- A. Shop Tests: Shop testing of tanks shall conform to testing methods and procedures established in referenced standards. Where leaks are detected, tank must be repaired as recommended by standards.
- B. Field Tests: Field testing shall conform to requirements of manufacturer, FDNY BFP and Contract Drawings.

END OF SECTION

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SECTION 43 4117 - PETROLEUM BULK STORAGE (PBS) PRODUCT PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Procure and furnish all labor, material and equipment required to install all piping, valves, fittings and appurtenances for installation of systems indicated on Contract Drawings or as directed by Commissioner.

1.02 RELATED DOCUMENT

- A. SECTION 43 4116 - PETROLEUM BULK STORAGE (PBS) TANK SYSTEMS
- B. SECTION 43 4118 - PETROLEUM BULK STORAGE (PBS) INSTRUMENTATION AND CONTROL
- C. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract [City of New York Standard Construction Contract].

1.03 APPLICABLE REFERENCES AND STANDARDS

- A. The following publications form a part of this Specification to extent referenced. Publications shall be latest published version:
 - 1. American Society for Testing and Materials (ASTM) A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - 2. ASTM D 2996 Standard Specification for Filament-Wound "Fiberglass" Glass-Fiber-Reinforced Thermosetting-Resin Pipe.
 - 3. Piping and accessories shall comply with ANSI, ASME, AWWA, ISA, and all other applicable federal, state, and municipal codes including revisions to date of Contract.
- B. Work performed under this section shall comply with following standards and all other applicable Federal, State and local standards, including revisions, to the date of contract.
 - 1. ASME American Society of Mechanical Engineers
 - 2. NFPA National Fire Protection Association
 - 3. UL Underwriters' Laboratories
 - 4. NEC National Electrical Code
 - 5. NYCEC The New York City Electrical Code
 - 6. ANSI American National Standards Institute
 - 7. IEEE Institute of Electrical and Electronic Engineers
 - 8. The Board of Standards and Appeals of the City of New York
 - 9. The Building Code of the City of New York
 - 10. New York City Fire Law Handbook
 - 11. AWS: American Welding Society
 - 12. FDNY Rules
 - 13. 6 NYCRR Part 613 - Petroleum Bulk Storage

14. 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of USTs
- C. Department of Environmental Conservation, Petroleum Bulk Storage Unit
47-40 21st Avenue
Long Island City, NY 11101-5407
Phone: 718 482-6453; Fax: 718 482-4098
<http://www.dec.state.ny.us/website/der/bulkstor/forms/index.html>
- D. FDNY Bureau of Fire Prevention (FDNY BFP)
9 Metro Tech Center, 5th floor
Brooklyn, NY 11201-3857
Phone: 718 999-2541
- E. FDNY Buildings Unit (FD)
48-34 35th Street
Long Island City, NY 11101
Phone: 718 784-6568
- 1.04 SUBMITTALS
- A. Submit manufacturer's specifications, installation instructions, and pipe test results.
- B. Contractor Shop Drawings submittals shall include, but not be limited to, following:
1. Manufacturer's descriptive, technical literature and catalog cuts, including installation instructions.
 2. Manufacturer's warranties.
 3. Piping layout drawing.
 4. Catalog cuts, as appropriate.
 5. Any deviations from Contract Drawings because of physical interferences, substitutions, or field verifications shall be clearly indicated on shop drawings

PART 2 PRODUCTS

- 2.01 UNDERGROUND PIPING AND FITTINGS
- A. All buried piping, unless otherwise specified, shall be double-walled pipe with black steel primary carrier pipe surrounded by a fiberglass outer containment pipe. Piping shall be capable of handling fluid for which it is intended and shall be UL-listed and approved for use in New York City by FDNY BFP. In addition, piping shall be capable of handling 100% methanol and B5 to B20 biodiesel.
- B. All secondary containment piping shall be fiberglass secondary containment system. All fiberglass piping and fitting joints shall be bonded.
- C. Outer containment piping shall be non-permeable pipe designed to retain any leakage and to channel such leakage as appropriate to a location equipped with a continuous automatically monitored leak detection system. Piping shall provide 100% containment of primary piping, including flexible

connectors. Leak detection system shall be as specified in Section on INSTRUMENTATION AND CONTROL.

- D. Vent piping shall be black steel.

2.02 FILL PIPE

- A. Furnish and install submerged drop tube in fill line of each petroleum storage tank as indicated on Contract Drawings.

2.03 ABOVEGROUND PIPING

- A. All aboveground pipe, unless otherwise specified, shall be full weight black steel pipe, ASTM A 53, Grade B welded. Vent riser piping shall be standard weight, Schedule 40, black steel pipe, ASTM A 53, Grade B welded.
- B. Each length of pipe shall be stamped with trademark of its manufacturer.
- C. Pipe to be installed shall be free of flaws, blisters, cracks, and all other imperfections or defects which would impair its quality. All pipe shall be tested by manufacturer under standard test pressure.
- D. All pipe threads shall be NPT standard, accurately and cleanly cut, and perfect in every aspect.
- E. Nipples shall be of same material and weight as pipes installed. Use of running nipples will not be permitted.
- F. Pipe sleeves shall be standard weight steel pipe, provided as required.

2.04 ABOVEGROUND PIPE FITTINGS

- A. All fittings and connections shall be screw-type except where indicated on Contract Drawings, or specified herein.
- B. All fittings, unless otherwise specified, shall be malleable iron, Class 150, with working pressure of 300 psi at 150 degrees Fahrenheit. Valves shall be manufactured by Stockham Valves and Fittings, or approved equal.
- C. Unions shall have bronze to bronze seats and shall be furnished and installed adjacent to, and on, the downstream side of each threaded-end valve and as shown on Contract Drawings, or as directed by Commissioner.
- D. Flanged connections may be used where indicated on the Contract Drawings and where necessary with approval of Commissioner.

2.05 VALVES

- A. Furnish and install check valve in suction line beneath dispenser to prevent suction line from draining.
- B. Furnish and install overfill valve in fill line entering storage tank. Fill line overfill valve shall be set to close when liquid level in tank reaches 90% of the tank capacity.

2.06 VENT CAPS

- A. Install primary tank normal vent cap with 2" thread-on connections at end of each vent riser. Install tank emergency vent caps with 6" thread-on connections at end of each vent riser. Vent caps shall be all metal construction, contain flame-retardant 40 mesh bronze screen and conform to NFPA 30. Vent caps shall prevent water and contaminants from entering tank and shall assure easy runoff from precipitation.
- B. Vent caps shall assure even pressure in tank during filling and pumping operations. Diesel system primary tank vent caps shall be up-flow vent caps.
- C. Primary and emergency tank vent fittings shall be obtained from the tank manufacturer for the specific tank model installed.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

- A. All underground piping shall be installed in pea gravel, in accordance with Manufacturer's recommendations, applicable codes, and as shown on Contract Drawings.
- B. Slope all suction and return lines towards tank sump at minimum of 1 inch per 8 foot of pipe, or as approved by Commissioner. Double swing joints of three elbows, or other flexible connectors acceptable to the FDNY BFP, shall be provided in suction, discharge, vent and fill piping except that only a single swing joint shall be required at vertical riser of vent line.
- C. Provide each tank with separate normal vent pipe not less than 2 inches diameter, terminated outdoors in non-hazardous location, be well braced in position, at least 10 feet from nearest building opening, and provided with weather proof hood having free area at least pipe size area. Except as approved by Commissioner to permit vapor recovery, vent pipes shall not be obstructed by devices that reduce its capacity thus causing excessive back pressure. Vent pipes shall be run from tank to outer air higher than fill pipe opening and, for tanks located outside buildings, at least 15 feet above adjacent ground level.
- D. All pipes and valves, except where otherwise indicated, shall be arranged so as to be easily accessible for service and repairs, and no change in the general arrangement indicated on Contract Drawings will be allowed unless approved by Commissioner. Where lengths of pipe are finally assembled, fittings shall be in correct alignment without forcing them into position.
- E. All pipes shall be accurately cut. Deformed or damaged pipe shall in no case be used. All bends shall be made with standard elbows and fittings. All threads shall be cleaned thoroughly and covered with suitable joint compound before joints are made. Every piece of pipe, valve and fitting which is part of pipe work shall be cleaned thoroughly before and, whenever possible, after installation.
- F. All piping shall be installed true to line and grade and be supported by suitable supports, spaced not more than 8 feet on centers. All such supports, anchors, clamps or other devices shall be of standard design, simple in installation, and of an approved manufacturer.
- G. Hangers, brackets, supports, anchors, clamps and other devices shall be hot-dip galvanized after fabrication and before assembly and installation. They shall be installed to make entire pipe system

self-supporting and rigid. Defective or inaccurately constructed hangers, brackets, supports, clamps, and other hardware shall not be used. Machine bolts, 5/8 inch in diameter and of proper length shall be used throughout for securing hangers, brackets, clamps, and supports for pipes larger than 3 inches, and 1/2-inch diameter bolts for pipes 3 inches and smaller.

- H. Where expansion bolts are required for securing supports and hangers, holes in masonry shall be drilled to exact size of bolts or sleeves. No packing shall be used. Expansion bolts shall be an approved type, diameter and length.
- I. All flanged and mechanical coupling connections shall be made with bolts and nuts of length and diameter required for particular flange size as determined by American National Standard Institute.
- J. Proper allowance for expansion and contraction shall be made. Wherever required pipe lengths are to exact dimensions, and where lengths of pipe are finally assembled, flanges and fittings shall be in correct alignment without forcing into position.
- K. Gate valve stems shall be vertical where possible and in no case below horizontal position.
- L. Pipe to be installed shall be free of flaws, blisters, cracks and all other imperfections or defects which would impair its quality. All pipe shall be tested by manufacturer under standard test pressure.

3.02 CUTTING OF MASONRY

- A. Where necessary for proper installation of piping, cut away or break through concrete or brick masonry and, after installation, replace and refinish masonry to satisfaction of Commissioner.

3.03 CUTTING OF GRADE BEAMS

- A. Where necessary for proper installation of piping, core drill through grade beams for necessary piping penetrations. All piping passing through grade beams shall be provided with sleeves of suitable size schedule 40 steel piping. All penetrations shall be restored to satisfaction of Commissioner.

3.04 TESTING

- A. Test piping systems in this Specification as indicated on Contract Drawings and as required by applicable codes and regulations. Perform each test in presence of Commissioner. Provide water, air and all labor, equipment and accessories to perform tests at no additional cost to the City of New York.
- B. Replace defective pipes and fittings at Contractor's expense with sound material. All joints examined during tests and found to be leaking, shall be caulked or otherwise made satisfactory in the opinion of Commissioner. Tests shall continue until a passing test is achieved.
- C. All test gauges shall be certified for accuracy. All instruments other than test instruments shall be disconnected during testing to prevent damage.

END OF SECTION

1.04 REFERENCES

- A. Department of Environmental Conservation, Petroleum Bulk Storage Unit
47-40 21st Avenue
Long Island City, NY 11101-5407
Phone: 718 482-6453; Fax: 718 482-4098
<http://www.dec.state.ny.us/website/der/bulkstor/forms/index.html>
- B. FDNY Bureau of Fire Prevention (FDNY BFP)
9 Metro Tech Center, 5th floor
Brooklyn, NY 11201-3857
Phone: 718 999-2541
- C. FDNY Buildings Unit (FD)
48-34 35th Street
Long Island City, NY 11101
Phone: 718 784-6568

1.05 SUBMITTALS

- A. Shop Drawings: Shop drawing submittals shall include, but not be limited to the following:
 - 1. Wiring and schematic diagrams and any other details required to demonstrate that system has been coordinated and will function properly as a unit.
 - 2. Equipment list, including size, input/output types, expected range of operation, utility requirements, and materials of construction. A List of Materials also shall be included and keyed to drawings. List of Materials shall provide sufficient information to determine compliance with Contract Drawings and Specifications.
 - 3. Drawings showing proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of work, including clearances for service and operation.
 - 4. Manufacturers' descriptive and technical literature, including catalog cuts.
 - 5. Manufacturer's warranties.
 - 6. Legends for name plates.
 - 7. Control panel and enclosure drawings providing arrangements, dimensions, cabinet door swing radii and terminations for all panels.
 - 8. Equipment certifications and test reports.
- B. Spare Parts Data: Within 30 days of Shop Drawings approval, furnish spare parts data for each different item of material and equipment specified. Data shall include a complete list of parts and supplies, with current unit prices and a source of supply. A list of all special tools required for installation, service, or repair of equipment shall be provided. Furnish those spare parts and special tools recommended by manufacturers. Provide 12-month supply of any expendable items and frequently replaced parts as identified by manufacturer.
- C. Provide operating and service instructions for each different type of control, instrument and system, as directed by Commissioner.
 - 1. Furnish to Commissioner 3 complete copies of operating instructions outlining procedures required for equipment and system start-up, operation and shut-down. Instructions shall

- include manufacturer's name, model number, service manual, parts list and brief description of all equipment and their basic operating features.
2. Furnish to Commissioner 3 complete copies of service instructions listing routine service procedures, possible breakdown and repairs, and troubleshooting guide.
- D. Performance Test Reports: Upon completion and testing of installed system, submit test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with specified performance criteria. Each test report shall indicate final position of controls.
- 1.06 MANUFACTURER'S SERVICES
- A. Provide services of manufacturer's representative experienced in installation, adjustment, and operation of specified instruments and controls. Representative shall supervise installation, adjustment and testing of equipment.
- 1.07 FIELD INSTRUCTION
- A. Provide field instruction course for designated operating staff for a total of the engine officer's 24 hours of normal working time (for each shift). Complete instruction prior to system's final acceptance by Commissioner. Instruction shall cover all items contained in operating and service manuals.

PART 2 PRODUCTS

- 2.01 GENERAL
- A. General instrumentation requirements are identified on Contract Drawings. All instruments and control equipment shall conform with the following general provisions.
- B. All equipment in a system shall be compatible in function and appearance. Provisions shall be made, where necessary, for signal dampening to suppress noise and spurious electrical signals in order to provide desired degree of performance.
- C. All instrument supports and interconnecting wiring and conduit shall be as recommended by manufacturer and approved by Commissioner.
- D. Identifying tag number for each instrument shall be permanently etched or embossed onto a durable tag which shall be fastened to the device housing with stainless steel rivets or self-tapping, stainless-steel screws of appropriate size. Where neither of the above fastening can be accomplished, tag number nameplates shall be permanently attached to device by a circllet of stainless-steel wire.
- E. All instruments and devices furnished under this Section requiring electrical power shall be suitable for operation on a 120 Volt $\pm 10\%$, 60 Hertz ± 2 Hertz supply.
- F. All instruments shall return to accurate measurement upon restoration of power after a power failure.

- G. Unless otherwise noted, all instruments in contact with a process stream shall be furnished with diaphragm seals.
- H. Instruments shall be guaranteed to exhibit the characteristics listed herein, under conditions listed and shall meet following specifications, except where otherwise noted:
 - 1. Accuracy $\pm 1\%$ of span
 - 2. Repeatability: $\pm 0.1\%$ of span
 - 3. Dead Band: $\pm 1\%$ of span (where applicable) in accordance with ISA Standard S50.1
 - 4. All signal generators and transmitters shall be capable of operating at a load of 600 ohm in accordance with ISA Standard S50.1, higher when specified. Signals shall be output isolated
 - 5. All electronic instruments shall be solid-state and capable of operating throughout temperature range of 10 degrees Fahrenheit to 110 degree Fahrenheit, unless otherwise specified
 - 6. Temperature effect on calibration shall be equal or less than 1% over a temperature change of 100 degrees Fahrenheit
- I. Ranges and scales shall be per Contract Drawings or approved by Commissioner.
- J. Where separate measuring elements and transmitters are required, they shall be fully matched and any special cables or equipment required must be supplied for installation.
- K. Contractor shall be responsible for matching of electrical characteristics of instruments and shall supply transmitters with ample signal output capacity. Additional signal generators or repeaters shall be avoided if possible, but must be supplied if necessary.
- L. Furnish all equipment, unless otherwise specified, in manufacturer's standard enclosure for service, indicated by equipment location.
- M. Include all miscellaneous necessary work required to complete installation, including but not limited to bolts, nuts, studs, gaskets, pipe tapping, holes through walls, and repair.
- N. Electrical control conductors shall be No. 14 AWG or larger. Use conductors larger than No. 14, where herein specified or where indicated on Contract Drawings.
- O. Size of conductors and other current-carrying parts of switches and control equipment shall be ample for rating of devices to which they are connected for service, without undue heating. In no case shall current density exceed 1,000 amperes per square inch of cross-section. At contacts, current density shall not exceed 150 amperes per square inch.

2.02 LEAK DETECTION/INVENTORY CONTROL SYSTEM

- A. Furnish and install leak detection/inventory control system which shall include all parts, equipment and software necessary for a complete system. Leak detection/inventory control system shall include, but not be limited to following:
 - 1. One (1) monitoring head/system controller with network card
 - 2. One (1) magnetostrictive technology type, inventory control and in-tank leak testing probe assembly (per tank, as required)
 - 3. One (1) annular space discriminating liquid sensing probe for interstitial space of AST
 - 4. One (1) discriminating liquid sensing probe per dispenser pan primary containment
 - 5. One (1) discriminating liquid sensing probe per dispenser pan secondary containment

6. One (1) discriminating liquid sensing probe per fill port secondary containment
 7. One (1) discriminating liquid sensing probe per tank room containment area
 8. Two (2) overfill alarms
 9. One (1) overfill alarm acknowledgment switch
 10. One (1) stick gauge calibrated in inches
- B. All leak detection/inventory control system components shall be those indicated in this specification section as manufactured by Veeder-Root, of Simsbury, Connecticut and distributed by Source North America of West Babylon, NY, Henrich Equipment Company of West Babylon, NY, Walters West End Supply of Lindenhurst, NY, or approved equal.
- C. Controller shall be capable of performing in-tank leak detection functions and external leak detection functions. Controller shall be completely compatible with all probes, sensors, and dispensers. Controller shall have LCD light groups identifying inventory, system status, setup, and diagnostics. Controller shall be supplied with an integral printer. Controller shall include all software and interface modules required for probes, sensors, dispensers, alarms, and other input/output devices required for a complete system. Controller shall be model TLS-450 S with network card, or approved equal, Monitoring Head/System Controller with Integral Printer, Model 847090-022 or approved equal, and Interstitial Sensor Interface, or approved equal. Controller shall be connected to ward monitoring system.
- D. Inventory control and in-tank testing probe assembly shall be magnetostrictive technology type. In-tank probe shall be capable of measuring product level in tank in inches, and detecting presence of water in tank. Probe shall be capable of performing 0.1 gallon per hour volumetric tank tightness testing and 0.2 gallon per hour automatic tank gauging in tank system. Probe shall meet NEC, NFPA, and UL requirements for hazardous locations. Probe electronics shall be capable of operating from - 20 Celsius to +50 Celsius. In-tank probe assembly shall include 4-inch floats and 4-inch sealed riser cap and ring. Each probe shall be completely compatible with fluid stored in tank. Probe shall be Series 8473 MAGI Magnetostrictive Probe with 4-inch Float Kit, Model No. 847391, or approved equal. Probe assembly shall also include Magnetostrictive Probe Installation Kit, Model No. 849600 or approved equal, and Riser Cap and Ring Kit, Model No. 312020-952 or approved equal. Controller shall be equipped with Four-Input Probe Interface Module, Model No. 329356-002 or approved equal.
- E. Annular space liquid sensing probes shall be capable of detecting and differentiating between liquid hydrocarbons and other liquids in interstitial space between tank walls. Probe shall meet NEC, NFPA and UL requirements for hazardous locations. Probe electronics shall be capable of operating from - 20 Celsius to + 70 Celsius. Annular space (or dike) sensor shall be Series 7943 Discriminating Interstitial Sensor, or approved equal. Controller shall be equipped with Eight-Input Type A Sensor Interface Module, Model No. 329956-001, or approved equal.
- F. The dispenser pan and fill port sensing probes shall be capable of detecting and differentiating between liquid hydrocarbons and other liquids in dispenser pan. Probe shall meet NEC, NFPA, and UL requirements for hazardous locations, and shall be capable of withstanding the harsh environment and wide temperature ranges possible in intended location. Dispenser pan sensor shall be Series 7943 Solid-State Discriminating Containment Sump Sensor, Model No. 794380-320 or approved equal. Controller shall be equipped with Six-Input Type B Sensor Interface Module, Model No. 329950-001 or approved equal.

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REPORT

GEOTECHNICAL INVESTIGATION

**FIREHOUSE FOR RESCUE 2
STERLING PLACE BETWEEN HOWARD AND
SARATOGA AVENUE
BOROUGH OF BROOKLYN
NEW YORK**

DDC PROJECT: F175RES2
SES#: 3838

CONTRACT REG NO. 20080015924
WORK ORDER NO. 5880-LBA-2-5719

Prepared for



City of New York Department of Design and Construction
Bureau of Environmental and Geotechnical Services
30-30 Thompson Avenue, Fifth Floor
Long Island City, New York 11101
January 2009

Prepared By



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LBA Project No : JU880F7

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Section 1 - INTRODUCTION

1.0 INTRODUCTION

1.1 GENERAL

On behalf of the New York City Department of Design and Construction (NYCDDC), Bureau of Environmental and Geotechnical Services (BEGS), Louis Berger & Associates, P.C. (LBA) conducted a geotechnical investigation and evaluation of the data with respect to the proposed Firehouse for Rescue 2 (Sterling Place between Howard and Saratoga Avenue), located close to the intersection of Sterling Place and Saratoga Avenue in Brooklyn, New York (herein referred to as the site).

This report presents a factual account of the subsurface conditions based on ten (10) boreholes inspected and logged by LBA, the laboratory test results, and geotechnical analyses and geotechnical evaluations, including conclusions and recommendations to assist the design team in the selection of a suitable foundation system for the proposed construction.

The site for the proposed development has an area of approximately 105 feet by 260 feet and is shown in Figures 1 and 2.

1.2 PROJECT DESCRIPTION

Based on the data provided by NYCDDC, Firehouse Rescue No.2 is one of six elite Rescue Companies in the New York City Fire Department. In addition to firefighting, the Rescue Companies are trained and equipped to respond to numerous types of emergencies that require the use of specialized tools and equipment, including a vehicle with a gross weight of about 75,000 lbs. New York City Rescue Companies are armed with a vast assortment of tools and equipment. In order to accommodate such diversified tools, equipment and heavy vehicles, the building was planned to consist of a two-story structure and would cover an area of approximately 20,000 square feet to house the apparatus and the lumber storage and cutting area.

The FDNY, with help of HPD (The New York City Department of Housing Preservation and Development) in Brooklyn, has selected the current site along Sterling Place (*Block 1467, part of Lot 22*), which has an approximate area of 25,500 square feet and is located north of the Eastern Parkway Extension in between Park Place to the north, Howard Avenue to the west and Saratoga Avenue to the east.

The current development plans may include two (2) stories (occupied) and an architectural feature consisting of a partial building projection of an additional story (limited in overall square footage). The development plans may also include a partial basement or a cellar.

1.3 PURPOSE AND SCOPE OF WORK

The objectives of this investigation were to identify the subsurface soils and provide geotechnical recommendations for the design and construction of new foundations. In order to achieve these objectives, the following scope of work was performed:

1. Provided full time field inspection services for the borings.
2. Performed a laboratory testing program on representative soil samples obtained from the borings. The laboratory testing program consisted of index tests for the purpose of confirming field soil classifications and assisting engineering analyses. Also selected representative samples for soil sulfate and chloride tests to evaluate the potential for sulfate and chloride attack on foundation concrete and reinforcement.
3. Prepared this geotechnical report that includes the following:
 - a. A description of the regional geologic features of the project site and subsurface investigation performed for this project;
 - b. A boring location plan showing the location of completed test borings;
 - c. The results of the engineering evaluations and recommendations regarding the foundation design, including:
 - Foundation type, estimated capacity and bearing elevation;
 - Geotechnical earthquake engineering considerations, including soil profile types and liquefaction potential;
 - Recommended soil parameters for design of below-grade walls;
 - The need for permanent groundwater control measures, if any;
 - Evaluation of the chloride and sulfate attack potential on foundation concrete and the steel members of the foundations.
 - d. A discussion of construction-related issues, including:
 - Excavation considerations, including the use of excavated materials;
 - Subgrade preparation and backfill requirements;
 - Protection of adjacent structures and utilities.
 - e. Appendices that include test boring logs and laboratory test results.

**Section 2 – SUBSURFACE INVESTIGATION
AND TESTING**

2.0 SUBSURFACE INVESTIGATION AND TESTING

2.1 GENERAL

The subsurface investigation consisted of a field investigation and geotechnical laboratory testing. The field investigation included performing ten (10) test borings and installing one (1) observation well within one of the completed test borings. Selected representative soil samples collected from test borings were sent to the laboratory to determine their index characteristics.

2.2 FIELD INVESTIGATION PROGRAM

Ten (10) borings with designated numbers as B-1 through B-10 were performed at the locations shown in Figure 1. These test borings were performed between December 1st and December 18 2008. Borings were drilled from the existing grade to depths ranging from 50 feet to 100 feet, but were all terminated in a bearing stratum. An LBA professional has inspected the boring operations, logged the subsurface and has selected and collected samples for laboratory testing. The borehole B-2 was developed with an observation well to estimate the depth to groundwater, and collect groundwater samples for environmental testing.

The test borings were performed by Aquifer Drilling and Testing Company, Inc. (ADT), using a CME-75 drill rig. Soil samples were obtained using techniques and equipment in general accordance with the American Society for Testing and Materials (ASTM) Standard Specifications. Representative samples were collected using a 1.4-inch inner diameter (I.D.) split-spoon Standard Penetration Test (SPT) sampler driven with a 140-pound automatic hammer with a 30-inch drop. Blow counts were recorded in accordance with ASTM D1586 to determine the SPT resistance "N" values. Continuous representative soil samples were collected to a depth of 12 feet and then after every five (5)-foot interval for examination and laboratory testing. The recovered split-spoon soil samples were visually classified and placed in protective glass jars, which were labeled with the project name and number, boring number, sample number and depth, and SPT blow counts.

The groundwater observation well was constructed from PVC Schedule 40, slot size 10 pipe. The installed well consisted of a 10-foot screen at the bottom connected to a 90 foot solid PVC riser. The annulus between the PVC and the wall of the test boring was backfilled with sand to within three (3) feet of the top of the borehole. The remainder of the annulus was backfilled with a cement bentonite grout.

The test boring logs are included in Appendix A.

2.3 LABORATORY TESTING PROGRAM

The geotechnical laboratory testing program for this project consisted of a significant number of sieve analyses due to the granular nature of the subsurface, and soil sulfate and chloride tests to

evaluate the potential for sulfate and chloride attacks on the concrete and steel elements of the foundation.

The following laboratory tests were conducted:

- Grain size distribution (sieve analysis) in accordance with ASTM D421, D422;
- Soluble Sulfate Determination in accordance with ASTM D516.
- Soluble Chloride Determination in accordance with ASTM D512.

Laboratory test results are presented in Appendix B.

2.4 REGIONAL GEOLOGY OF THE PROJECT AREA

The site lies within the Atlantic Plain physiographic province. The greater portions of the sediments exposed at the surface in Brooklyn and within the boring limits of 100 feet of the project site consist of Pleistocene glacial deposits of outwash nature. Although not encountered at the project site, Holocene Tidal Marsh overlies Pleistocene glacial deposits, which are only present along the south shore of Brooklyn and Queens. These sediments consist of clayey silt, fine sands and organic material.

According to the hydrogeologic studies conducted on Long Island and within the vicinity of the town of Oyster Bay by the USGS (Isbister 1966; Franke and Cohen 1972), the area is underlain by more than 1,000 feet of unconsolidated deposits of sand, silt, gravel and clay (i.e. Pleistocene glacial till), which rests unconformably on the bedrock surface. Below the glacial till is the Late Cretaceous Raritan Formation, which includes the Lloyd Sand Member and Raritan Clay. Bedrock is considered to be Fordham Gneiss of the Proterozoic Age, the Brooklyn Injection Gneiss and Ravenswood Granodiorite of the early Paleozoic Age. It generally consists of schists, gneiss and to lesser extent amphibolites. It generally slopes southeast, with altitudes ranging from outcrops at ground level, near Long Island City, to about 800 feet below sea level in the vicinity of the Rockaways. The general slope of the bedrock is estimated as about 80 feet per mile.

2.5 SUBSURFACE CONDITIONS

Subsurface conditions were summarized from the record of boring data prepared by LBA (NYCDDC, 2009). Based on the information collected from this investigation, there are generally two (2) different strata with different geotechnical characteristics underlying the existing ground surface within the project site. From top to bottom, these strata are as follows:

- 1) Fill
- 2) Sand with infrequent gravel layers

A summary of the subsurface conditions, including a brief description of each stratum and the geologic units identified in the boring logs, is presented below.

Stratum 1 **Fill, 7:** A layer of fill (including soils logged as possible fill) was encountered in all of the borings at the existing grade or below pavement section (asphalt or concrete) to a depth of between six (6) feet (in B5) and 18.5 feet (in B-6 and B-7) below the existing ground surface (bgs). The fill has an average thickness of 12 feet. The lowermost bottom elevation of fill is about + 54 feet as observed in B-6

and B-7 (based on the Borough of Brooklyn Highway Datum, which is 2.560 feet above mean sea level at Sandy Hook, as established by the U.S. Coasts & Geodetic Survey).

The fill generally consisted of fine to medium brown to dark brown to yellow brown sand with little to some gravel and trace to some silt. In B-6, the fill consisted of gravel with little medium to coarse dark brown sand and trace silt. The fill is generally clean with occasional trace amounts of brick pieces. The laboratory tests of the fill indicated a silt content ranging from seven (7) to 33 percent, while the gravel content ranged from 11 to 46 (in B-7) percent. In B-6, the gravel content was greater than 50 percent where the fill was classified as gravel. Standard Penetration Test (SPT) resistance "N" values (ASTM Standard D1586) in the fill ranged from 16 to 50+ blows/foot, the average being greater than 30 blows/foot, indicating the relatively homogeneous nature of the fill soils and their relative dense to very dense compactness, due most likely to their placement in controlled filling. Fill was classified as Soil Class 7, in accordance with the New York City Building Code.

Stratum 2 **Sand (SP, SM, SW) with discontinuous layers of gravel (GP, GM, GW), 3.a, 3.b, 2.a and 2.b.:** This stratum was observed below the fill at depths between six (6) feet (in B-5) and 18.5 feet (in B-6 and B-7) bgs where the top elevation of this unit was observed at +54 feet in B-6 and B-7, and +66 feet in B-5. This unit also includes layers of gravel in thickness ranging from two (2) feet in B-8 to 20 feet in B-4. However, the average thickness of the gravel is about ten (10) feet where present and the transition from sand to gravel, or from gravel to sand, is always gradual. The sand portion of this unit consisted generally of fine to medium to coarse brown sand, trace to -and gravel, and trace to some silt. In between the sand layers, where gravel is present, this unit is described as gravel, trace to -and sand, trace to little silt. The laboratory tests conducted in representative samples from this unit indicated that the gravel content ranged from 0 to 51 percent, the sand content from 41 to 89 percent and the silt content from six (6) to 26 percent. Based on the record of borings (relatively deep boreholes), the thickness of sand (and gravel, where present) is in excess of 93.5 feet. The SPT resistance "N" values in sandy soils ranged from 19 to 50+ blows/foot, with an average being greater than 40 blows/foot, indicating that these deposits were dense to very dense. This stratum was generally classified as Soil Class 3.a and to a lesser extent Soil Class 3.b, 2.a and 2.b, in accordance with the New York City Building Code.

2.6 GROUNDWATER CONDITIONS

An observation well B-1 was installed during the field work. The well, however, was vandalized overnight. Another observation well was installed subsequently in B-2. The following groundwater measurements were made inside the observation well B-2:

Boring	Date of Reading	Time	Groundwater Level (ft)	Groundwater Elev. (ft)
B-2	12/ 23/2008	11:00 AM	61.1	+12.8
	12/23/2008	01:30 PM	62.4	+11.5
	12/23/2008	08:00 AM	61.5	+12.4

It should be noted that the groundwater table is expected to fluctuate depending on climatic factors, tidal and surface drainage conditions and other factors.

Section 3 – ENGINEERING RECOMMENDATIONS

3.0 ENGINEERING RECOMMENDATIONS

3.1 GENERAL

This section of the report presents our geotechnical evaluation and recommendations for the design of the proposed building foundations. At the time of the preparation of this report, the final footprint area, the framing, or the column dispositions and loads were not available for review. Therefore, our evaluations and recommendations are based on the results of the field investigation performed for this project and our current understanding of the proposed project requirements.

3.2 SEISMIC CONSIDERATIONS

Available information indicates that the subsurface conditions at the site generally consist of dense to very dense granular soils (i.e. sands and gravels) to the limits of the borings. Assuming that these conditions represent the subsurface conditions to the bedrock depth, the recommended seismic site classification is *stiff soil profile, Site Class D*.

Based on SPT blow counts obtained from the borings, and depth to groundwater combined with the compactness of sand and gravel, the site can be classified as liquefaction unlikely in an earthquake event.

3.3 FOUNDATION RECOMMENDATIONS

It is recommended that the proposed building be supported on a shallow foundation system consisting of spread footings or continuous wall footings bearing on Stratum 2 (i.e., sand and gravel). As the current development plans include a partial basement or a cellar, and the average thickness of fill is about eight (8) feet, excavation and re-placement of fill would be required to place the foundations on natural soils/controlled fill as required by the New York City Building Code (see Section 4.2 for fill). The recommended allowable bearing pressure for shallow foundations bearing on the Stratum 2 sand and gravel, or controlled fill, is four (4) tons per square foot in accordance with the New York City Building Code.

3.4 SUPPORT OF SLAB ON GRADE

The subsurface conditions below the proposed cellar level will be dependent on the final elevations established for the proposed structure. As described in Section 2.5 of this report, the fill consists of dense granular soils with none to trace foreign material, and thus may be considered as satisfactory bearing material for the floor slab (though not for the foundations, unless further investigations are conducted). Accordingly, the floor slab for the proposed structure may be cast as slab-on-grade after removal of the topsoil and improving the characteristics of the Stratum 1 Fill, or on the natural soils of Stratum 2. In order to prepare a suitable homogeneous subgrade to receive the floor slab, the footprint area should be cut to 12

inches below the bottom of the design grade of the floor slab. The exposed surface should be compacted to 95% of the maximum dry density of the Stratum 1 fill (i.e., sand and gravel) using a smooth roller as determined in ASTM D 1557. A smooth roller is recommended to mitigate against vibrations and reduce potential harm to the existing structures in the vicinity. Excluding the topsoil and the asphalt concrete at the surface, the excavated soils should then be placed to slab bottom grade, less six (6) inches, in a controlled manner, and again should be compacted to 95% of the maximum dry density of the Stratum 2 soils. A drainage layer of ¾-inch size crushed stone, six (6) inches thick, should be placed below the slab-on-grade. It is recommended that a separation fabric, for example Typar 3601 or equivalent, should be placed between the Stratum 1 fill and the overlying crushed stone. Following the preparations suggested above, the slab-on-grade can be designed using a modulus of subgrade reaction of 120 lb/in²/in using a 1-foot x 1-foot plate. Subgrade preparation for the slab-on-grade is further explained in Section 4.2.

3.5 LATERAL EARTH PRESSURES

For the partial basement, or the cellar, the below-grade walls should be designed to resist lateral earth pressures developed from the surrounding soil, backfill, surcharge (due to the movement of the construction vehicles) and earthquake loads. An at-rest lateral earth pressure equivalent to a fluid pressure of 53H lb/ft, considering no hydrostatic pressure acting on the wall, is recommended for the design of the below-grade walls to account for soil pressures, where H is the height of the wall in feet. In addition, below-grade walls—in particular, the walls along Sterling Place—should resist surcharge loads, which are recommended to be 88H lb/ft, where H is the height of the basement/cellar wall. The estimated point of application of the surcharge and soil loads is about 0.45H from the bottom of the wall.

The below-grade walls should also be designed to ensure stability in an earthquake event in accordance with the guidelines given in Section BC1617 of the New York City Building Code. In addition, if the foundation wall is within the influence line of the adjacent structure foundations, the design of the permanent below-grade walls should take these additional lateral loads into account.

3.6 PERMANENT GROUNDWATER CONTROL

Measurements taken at the time of the subsurface investigation indicated groundwater at a depth of about 60 feet below the existing grade, well below the influence of the foundations. Accordingly, a partial basement, or the one-level cellar, will be above the groundwater level. However, to mitigate against a storm event, it is recommended that a drainage system be installed.

It is recommended that a crushed stone layer (a minimum of six (6) inches thick) be placed beneath the cellar slab and that a drainage piping system be installed within the crushed stone at the base of the exterior perimeter walls. The crushed stone should conform to the gradation requirements of commercially known ¾-inch crushed stone and should be placed over the entire cellar area. The drainage pipes should be six (6)-inch diameter corrugated perforated plastic pipe (Advanced Drainage System N-12, or approved equivalent). The pipes should be wrapped in



fabric (Tygar 3801, or equivalent) encased with a minimum six (6)-inch thick envelope of crushed stone, placed with a positive slope of about $\frac{1}{32}$ -inch to $\frac{1}{16}$ -inch per foot of pipe, and connected to the sump pits.

Section 4 – CONSTRUCTION CONSIDERATIONS

4.0 CONSTRUCTION CONSIDERATIONS

4.1 GENERAL

The following sections provide recommendations regarding the subgrade preparation, excavations, construction monitoring and temporary groundwater control measures.

4.2 SUBGRADE PREPARATION

In addition to the building code requirements, we recommend that upon excavating to the proposed subgrades for the footings, the subgrade material should be inspected by a geotechnical engineer to ensure that the material encountered at the bearing level is the anticipated bearing material. Any disturbed or unstable areas encountered which cannot be stabilized by additional compaction should be excavated to competent material or a maximum depth of six (6) feet and the area backfilled with compacted structural fill.

Soil subgrades should also be protected from frost action to limit possible subgrade deterioration resulting from freezing and thawing cycles. Concrete should not be poured if subgrades are wet, muddy or frozen.

4.3 EXCAVATION CONSIDERATIONS

Because the groundwater is well below the foundation bottom elevations, local temporary soil excavations (e.g., for excavation of footings) can have cut slopes 1H: 1V. Should site conditions dictate (i.e., potential undermining of the utilities along Sterling Place, or the adjacent buildings in the west and northeast of the project site), the alternative to open excavation is to install temporary sheeting and shoring. Depending on the ability of the contractor, a conventional excavation support system may also be used. The conventional system can consist of trench boxes or closely spaced soldier beams and timber lagging with temporary tiebacks beneath street level. The design of any soil slopes will be the responsibility of the foundation contractor's engineer. The design of temporary cuts should conform to pertinent OSHA and City of New York safety regulation (New York City, Administrative Code, Section 26-229: Safety requirements during excavation operations).

4.4 UNDERPINNING

Underpinning will, or may be required for the existing adjacent buildings where the foundations of existing buildings are above the proposed excavation levels and the proposed structure is within 20 feet of an existing building. Underpinning of the adjacent structures should transfer the foundation loads from their present bearing level to a level below the lowest excavation elevation of the proposed building. The extent of the required underpinning cannot be determined at present due to the limited information available regarding the elevations, locations and bearing grades of the foundations of the proposed and existing adjacent structures. It is

recommended that information be collected regarding the final footprint, type and depth of the foundations of the proposed and the existing adjacent structures. This information should then be evaluated for the need for underpinning of the existing structures and perhaps some of the utilities along Sterling Place. The proposed underpinning system should be designed by the Contractor's New York State Registered Professional Engineer, and should be reviewed, approved and inspected by the client or by his consultants.

4.5 BACKFILL AND COMPACTION REQUIREMENTS

Backfill material should be granular soils free of cinder, brick, asphalt, ash and other unsuitable materials. Provided that it meets the fill requirements of the NYCDEC, grain size analysis indicates that the Stratum 1 fill may be suitable for backfill and structural fill, part of which may need to be screened to meet the following grading requirements:

- Maximum particle size – three (3) inches
- No more than 30% by weight retained on the ¾-inch sieve
- No more than 40% by weight passing the #100 sieve
- No more than 12% by weight passing the #200 sieve, non-plastic

We recommend that backfill placed beneath the slab-on-grade be compacted to a minimum of 95% of the maximum dry density, as determined by ASTM D1557-88, Method C. All backfill should be placed in lifts not exceeding eight (8) inches in loose thickness. The subgrade underneath the backfill should be satisfactorily proofrolled prior to the placement of backfill, using a fully-loaded dump truck with a minimum of six (6) passes, or as directed by the project geotechnical engineer.

4.6 CORROSION AND SULFATE ATTACK POTENTIAL

Preliminary chemical tests, including tests for soluble sulfate and chloride contents, were performed on selected soil samples to evaluate the preliminary corrosion potential for ferrous metals (i.e. uncoated steel) and sulfate attack on concrete. Tested soil samples were collected from different layers of the subsurface soils, generally from the soils at or near the proposed foundation elevations. The test results are presented in Appendix B.

Analyses of the soil samples show that the concentration of sulfate (as SO₄) ranged from 88 ppm to 270 ppm, with an average of about 180 ppm, and that of chloride (Cl) ranged between 189 ppm and 308 ppm. The concentrations of sulfate in soil indicate a "negligible" potential for sulfate attack on concrete (based on IBC, 2006, Table 1904.3). Therefore, dense concrete of Type I or Type II Portland cement can be used in all foundation concrete and concrete in contact with soil and water. Buried concrete should be dense, fully compacted, and the minimum cement content requirement of ACI should be observed. Chloride contents, however, indicate a "mild" potential for corrosion to uncoated, ferrous metals (such as reinforcing bars, steel pipes or other steel members of the structure in contact with the soil). Accordingly, adequate cover for

reinforcement steel in accordance with ACI requirements should be provided. Pipes in contact with soil should also be protected in accordance with the manufacturer's recommendations.

4.7 TEMPORARY GROUNDWATER CONTROL

Measurements taken at the time of the subsurface investigation did not indicate the existence of groundwater at or above a depth of about 60 feet below the ground surface. Therefore, we do not anticipate any dewatering during construction.

Section 5 - LIMITATIONS

5.0 LIMITATIONS

Professional judgments were necessary in relation to determining stratigraphy and subsurface conditions from the subsurface investigations. Therefore, the data presented and the opinions expressed in this report are qualified as follows:

1. This report has been prepared by Louis Berger & Assoc., P.C. (LBA) for the New York City Department of Design and Construction (NYCDDC) to be used solely by NYCDDC in the evaluation and performance of the proposed work related to the proposed Firehouse for Rescue 2, Sterling Place between Howard and Saratoga Avenues, in Brooklyn, New York. The report has not been prepared for use by other parties, and may not necessarily contain sufficient information for the purposes of other parties or other uses. Any undisclosed and/or un-permitted alternate use shall be at that party's own risk and without liability to LBA.
2. The conclusions and recommendations provided in this report are based upon our understanding of the described project information and on our interpretation of the information, the visible conditions for accessible properties and the data that were available and/or collected during the performance of this study. Unless otherwise stated, the work performed by LBA should be understood to be exploratory and interpretational in character. Any results, findings or recommendations contained in this report may be the result, at least in part, of professional judgment and not necessarily based solely on pure science and engineering.
3. Our professional geotechnical engineering services for this project have been performed using a degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice in this report.
4. In preparing this report, LBA 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, LBA has not attempted to verify the accuracy or completeness of any such information. LBA derived the data in this report primarily from visual inspections of soil samples and selected laboratory testing, and 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.
5. 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 the site conditions in existence at the time of investigation.

Section 6 – REFERENCES

6.0 REFERENCES

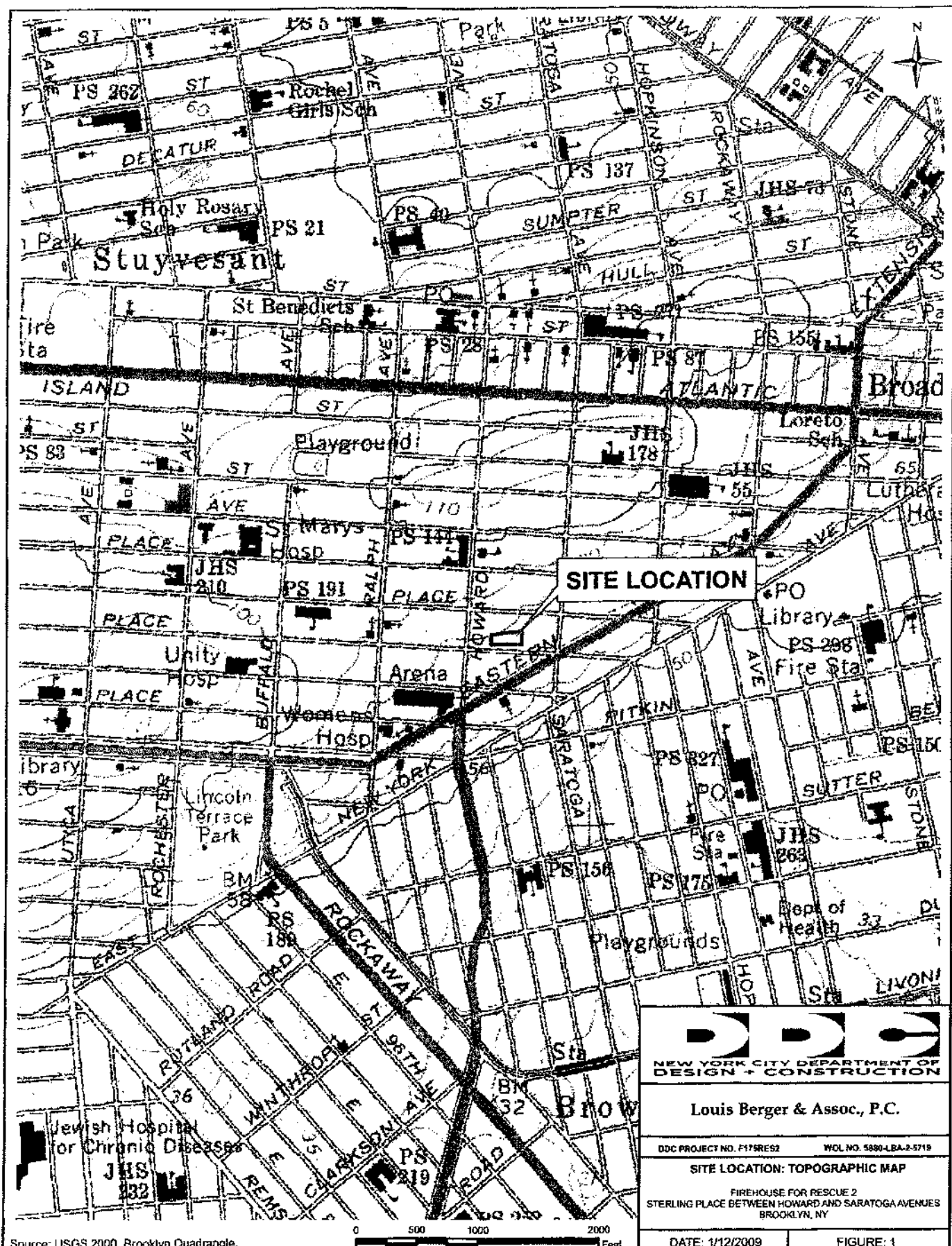
Baskerville, C.A., 1990, Bedrock and Engineering Geologic Maps of New York and parts of Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey, Sheets 1 to 3.

NYCDDC (The New York City Department of Design and Construction), 2009, Record of Borings, Firehouse for Rescue 2, Sterling Place between Howard and Saratoga Avenue Borough of Brooklyn, New York, F175RES2-3838.

New York City Building Code (2008)

USGS (United States Geological Survey), 2000, 7.5-Minute Topographic Map Series, Brooklyn. Quadrangle, NY, New York, map scale 1"=2000'.

FIGURES



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

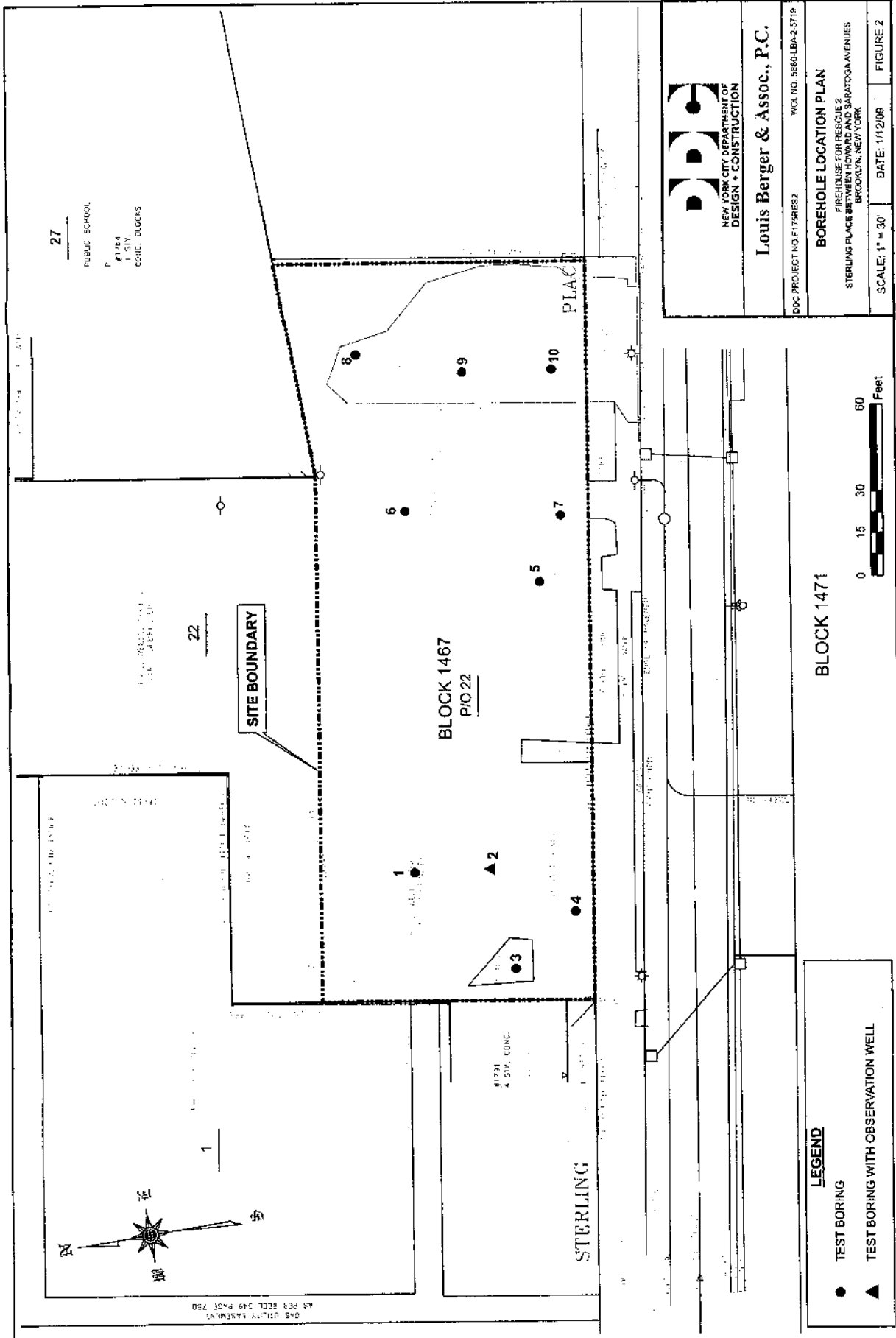
Louis Berger & Assoc., P.C.

DDC PROJECT NO. P175RES2 WCL NO. 5330-LEA-2-5719

SITE LOCATION: TOPOGRAPHIC MAP

FIREHOUSE FOR RESCUE 2
STERLING PLACE BETWEEN HOWARD AND SARATOGA AVENUES
BROOKLYN, NY

DATE: 1/12/2009 FIGURE: 1



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Louis Berger & Assoc., P.C.

DOC PROJECT NO. F175RES2 WOL NO. 5860-LBA-2-5719

BOREHOLE LOCATION PLAN

FIREHOUSE FOR RESCUE 2
STERLING PLACE BETWEEN HOWARD AND SARATOGA AVENUES
BROOKLYN, NEW YORK

SCALE: 1" = 30' DATE: 11/2/06 FIGURE 2



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LONG ISLAND CITY, N.Y. 11101

LOUIS BERGER AND ASSOC., P.C.
199 WATER STREET, 23RD FLOOR, NEW YORK CITY, NY 10038

BOROUGH: BROOKLYN JOB # 3838 BORING # B-1
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: MEHMET SAKAR
CONTRACTOR: ADT
DRILLER: J. CAMPBELL
HELPER: S. VERNON

BORING LOG

SHEET 1 OF 1

Date Started: 12/1/2008
Date Finished: 12/2/2008

Depth of Hole: 55'
Rig Type: CME 75
Casing Size: 4"

Spoon Type: 2" od
Drilling Bit Type: R.BIT
Depth of Casing: 15'

Weight of Hammer: For Casing: 300 lb;
Weight of Hammer: For Spoon: 140 lb;
Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA

PC # XXX
Asphalt: XXX
Concrete: XXX

Wellpoint Installed: 55'
PVC Riser: 45'
Screen: 10'

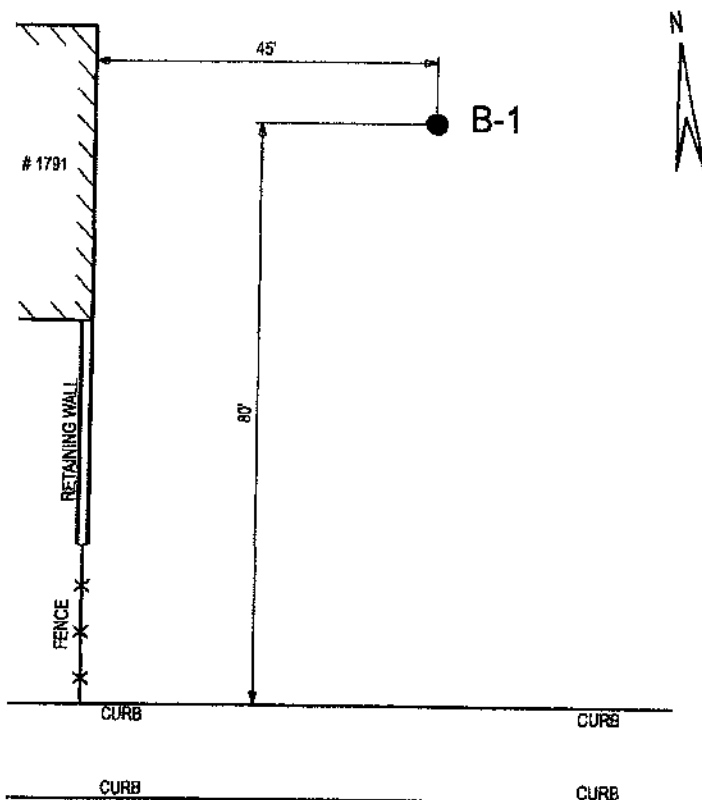
GROUND WATER RECORD

DATE	TIME	DEPTH
XXX	XXX	XXX
XXX	XXX	XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊕ Previously Done Test Boring (see job as noted)
- ⊗ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⊙ Caution Symbol Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



STERLING PL.

INSPECTORS REMARKS:

MONITORING WELL WAS DAMAGED OVERNIGHT AND WAS ABANDONED.

DEPTH
in feet
0

5

10

15

20

25

30

35

40

45

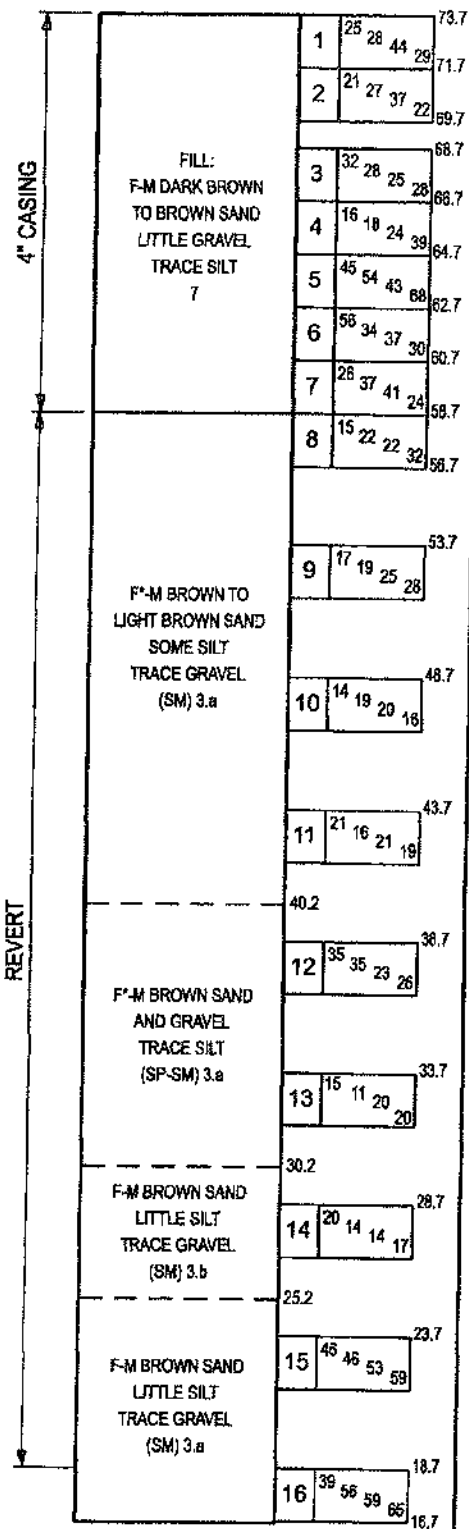
50

55

60

B-1

SURF. EL. 73.7





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LOUIS BERGER AND ASSOC., P.C.

199 WATER STREET, 23RD FLOOR, NEW YORK CITY, NY 10038

BOROUGH: BROOKLYN **JOB #** 3838 **BORING #** B-2
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANLALE
CONTRACTOR: ADT
DRILLER: P. GADDIS
HELPER: C. CHEILLOU

BORING LOG

SHEET 1 OF 2

Date Started: 12/16/2008

Date Finished: 12/18/2008

Depth of Hole: 100'
Rig Type: CME 75
Casing Size: 4"

Spoon Type: 2" od
Drilling Bit Type: R.BIT
Depth of Casing: 20'

Weight of Hammer: For Casing: 300 lb;
Weight of Hammer: For Spoon: 140 lb;
Type of Hammer: AUTOMATIC

PAVEMENT CORE DATA

PC # XXX
Asphalt: XXX
Concrete: XXX

Wellpoint Installed: 100'

PVC Riser: 90'
Screen: 10'

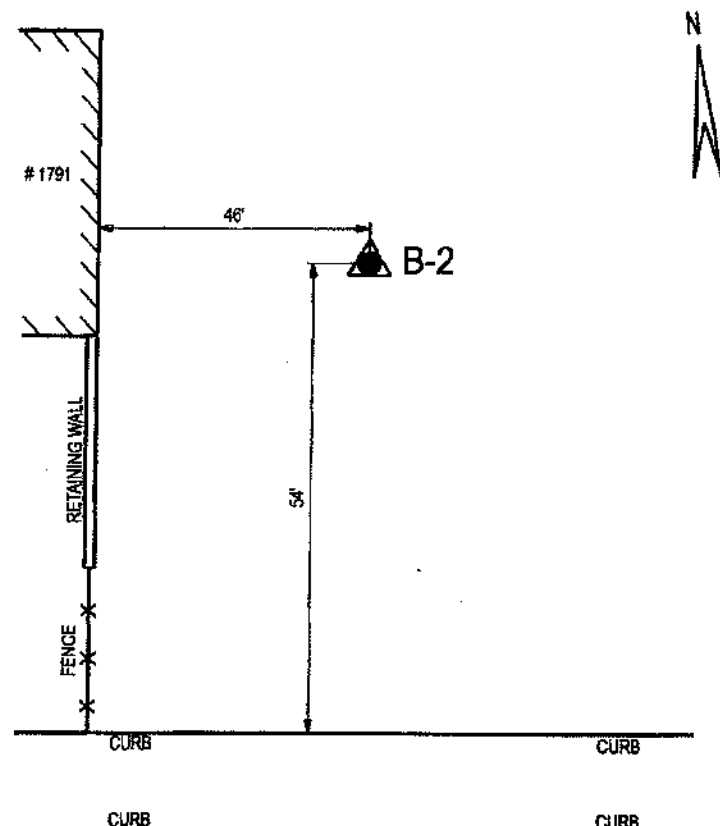
GROUND WATER RECORD

DATE	TIME	DEPTH
12/23/08	11:00 AM	61.1'
12/23/08	1:30 PM	62.4'
12/24/08	8:00 AM	61.5'

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊕ Previously Done Test Boring (see job as noted)
- ⊗ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⊙ Caution Symbol
- Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



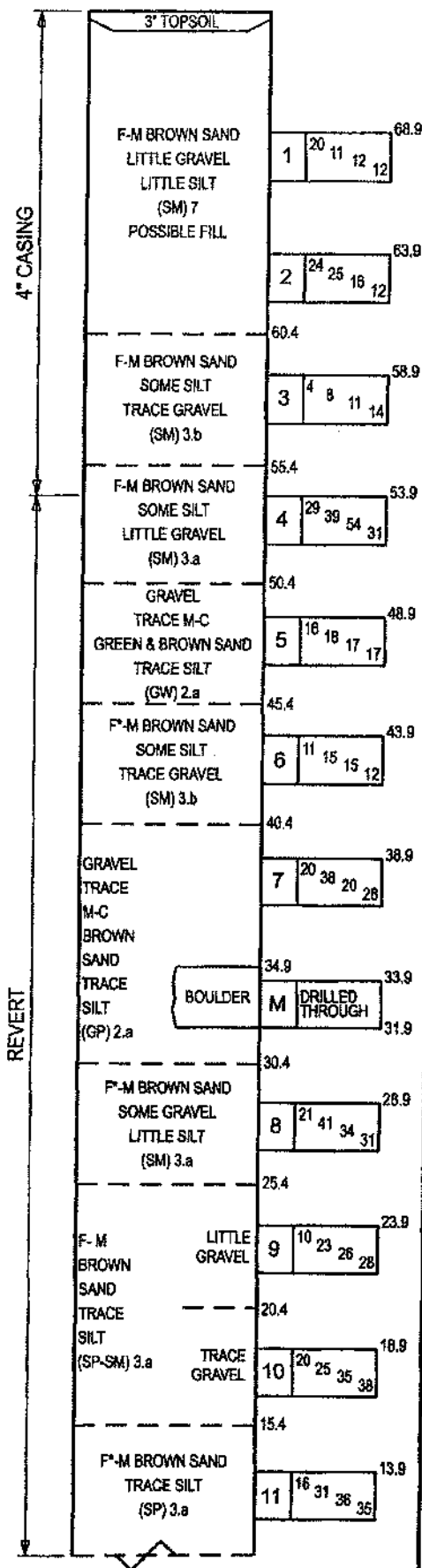
INSPECTORS REMARKS:

M INDICATES MISSING SAMPLE (DRILLED THROUGH)

DEPTH
in feet

B-2

SURF. EL. 73.9





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BOROUGH: BROOKLYN JOB # 3838 BORING # B-4
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANLAE

CONTRACTOR: ADT

DRILLER: J. CAMPBELL

HELPER: S. VERNON

BORING LOG

SHEET 1 OF 1

Date Started: 12/15/2008

Date Finished: 12/16/2008

Depth of Hole: 50' Spoon Type: 2" od Weight of Hammer: For Casing: 300 lb;
Rig Type: CME 75 Drilling Bit Type: R.BIT Weight of Hammer: For Spoon: 140 lb;
Casing Size: 4" Depth of Casing: 18' Type of Hammer: AUTOMATIC

PAVEMENT CORE DATA

PC # XXX Wellpoint Installed: XXX
Asphalt: XXX PVC Riser: XXX
Concrete: XXX Screen: XXX

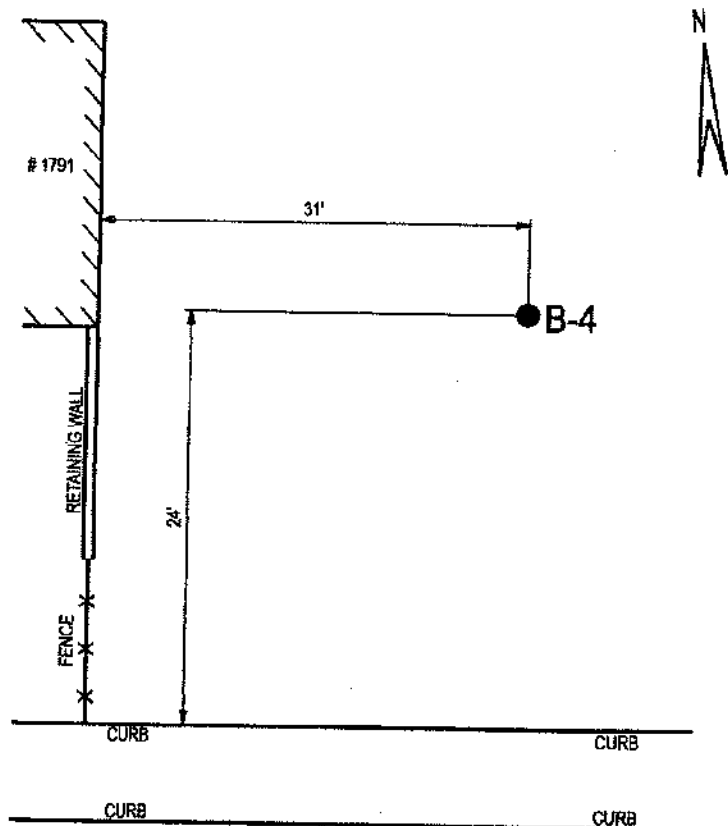
GROUND WATER RECORD

DATE	TIME	DEPTH
XXX	XXX	XXX
XXX	XXX	XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊙ Previously Done Test Boring (see job as noted)
- ⊕ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⚠ Caution Symbol
- ⊙ Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



INSPECTORS REMARKS:

DEPTH
in feet

0

5

10

15

20

25

30

35

40

45

50

55

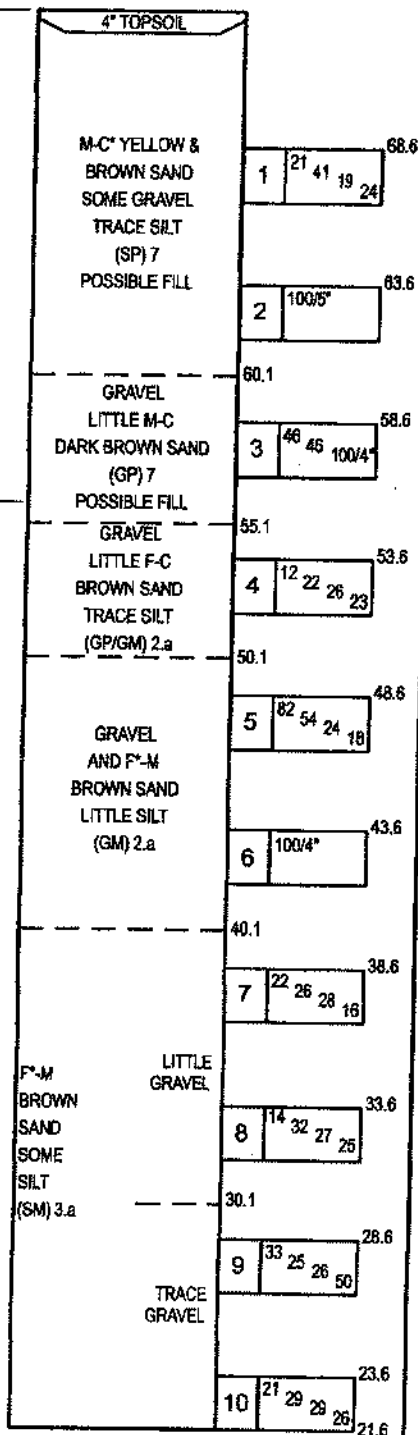
60

B-4

SURF. EL. 73.6

4" CASING

DRILLING MUD





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BOROUGH: BROOKLYN JOB # 3838 BORING # B-5

PROJECT: FIREHOUSE FOR RESCUE 2

LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANALE

CONTRACTOR: ADT

DRILLER: J. CAMPBELL

HELPER: S. VERNON

BORING LOG

SHEET 1 OF 1

Date Started: 12/5/2008

Date Finished: 12/5/2008

Depth of Hole: 50'

Rig Type: CME 75

Casing Size: 4"

Spoon Type: 2" od

Drilling Bit Type: R.BIT

Depth of Casing: 13'

Weight of Hammer: For Casing: 300 lb;

Weight of Hammer: For Spoon: 140 lb;

Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA

PC # XXX

Asphalt: XXX

Concrete: XXX

Wellpoint installed: XXX

PVC Riser: XXX

Screen: XXX

GROUND WATER RECORD

DATE TIME DEPTH

XXX XXX XXX

XXX XXX XXX

LEGEND

● Test Boring

○ Test Boring (Failed Attempt)

⊕ Previously Done Test Boring
(see Job as noted)

⊗ Environmental Test Boring

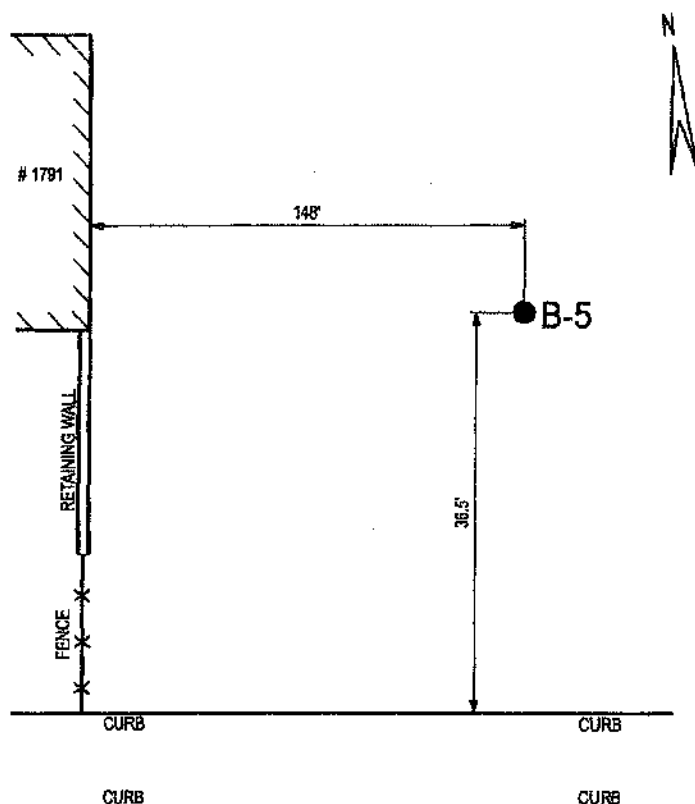
□ Pavement Core

▲ Test Boring With Observation Well

⊕ Caution Symbol

⊗ Pavement Core and Test Boring
(at same location)

LOCATION PLAN (NOT TO SCALE)



INSPECTOR'S REMARKS:

DEPTH
in feet

0

5

10

15

20

25

30

35

40

45

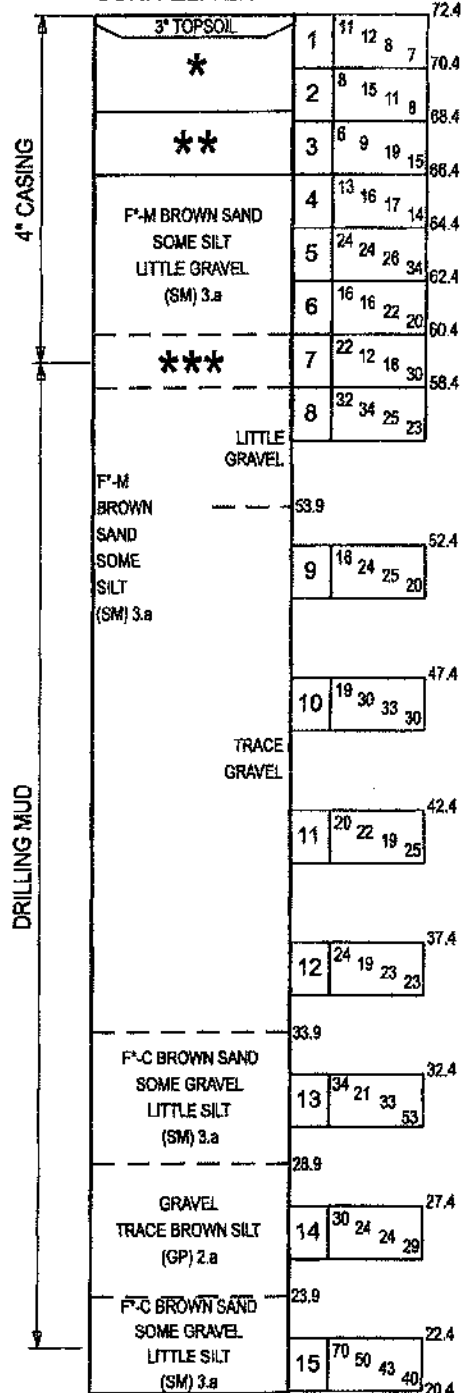
50

55

60

B-5

SURF. EL. 72.4



* FILL:
F-C DARK BROWN SAND
LITTLE GRAVEL
TRACE SILT
7

** FILL:
GRAVEL
TRACE DARK BROWN SILT
7

*** F-M BROWN SAND
SOME SILT
LITTLE GRAVEL
(SM) 3.b



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BOROUGH: BROOKLYN JOB # 3838 BORING # B-6
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANLALE
CONTRACTOR: ADT
DRILLER: P.GADDIS/J. CAMPBELL
HELPER: C. CHEILLOU/S. VERNON

BORING LOG

SHEET 1 OF 1

Date Started: 12/12/2008
Date Finished: 12/15/2008

Depth of Hole: 50'
Rig Type: CME 75
Casing Size: 4"

Spoon Type: 2" od
Drilling Bit Type: R.BIT
Depth of Casing: 8"

Weight of Hammer: For Casing: 300 lb;
Weight of Hammer: For Spoon: 140 lb;
Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA
PC # XXX
Asphalt: XXX
Concrete: XXX

Wellpoint Installed: XXX
PVC Riser: XXX
Screen: XXX

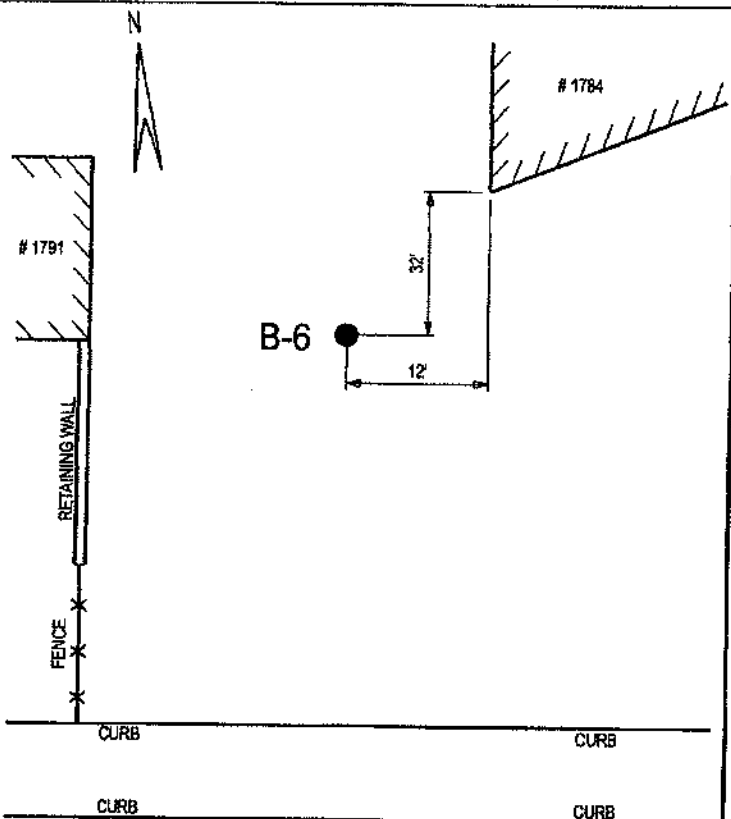
GROUND WATER RECORD

DATE	TIME	DEPTH
XXX	XXX	XXX
XXX	XXX	XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊕ Previously Done Test Boring (see job as noted)
- ⊗ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⊙ Caution Symbol
- ⊗ Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



STERLING PL.

INSPECTOR'S REMARKS:

M INDICATES DRILLED THROUGH

DEPTH
in feet

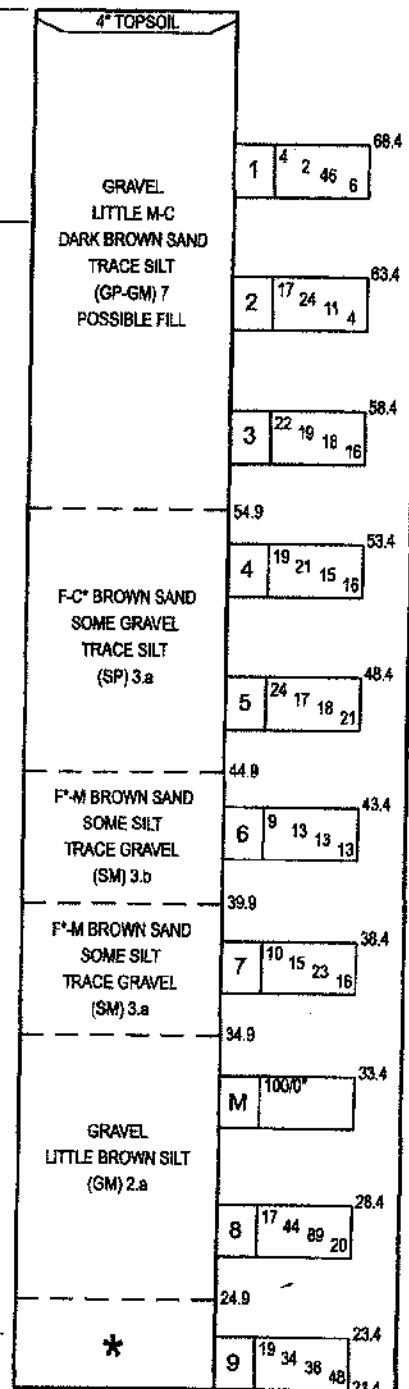
0
5
10
15
20
25
30
35
40
45
50
55
60

B-6

SURF. EL. 73.4

4" CASING

DRILLING MUD



* F-M BROWN SAND
SOME GRAVEL
TRACE SILT
(SP-SM) 3.a



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199 WATER STREET, 23RD FLOOR, NEW YORK CITY, NY 10038

BOROUGH: BROOKLYN JOB # 3838 BORING # B-7
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANLAE
CONTRACTOR: ADT
DRILLER: J. CAMPBELL
HELPER: S. VERNON

BORING LOG

SHEET 1 OF 2

Date Started: 12/8/2008

Date Finished: 12/9/2008

Depth of Hole: 100'
Rig Type: XXX
Casing Size: XXX
Spoon Type: 2" od
Drilling Bit Type: R.BIT
Depth of Casing: 13'

Weight of Hammer: For Casing: 300 lb;
Weight of Hammer: For Spoon: 140 lb;
Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA
PC # XXX
Asphalt: XXX
Concrete: XXX
Wellpoint Installed: XXX
PVC Riser: XXX
Screen: XXX

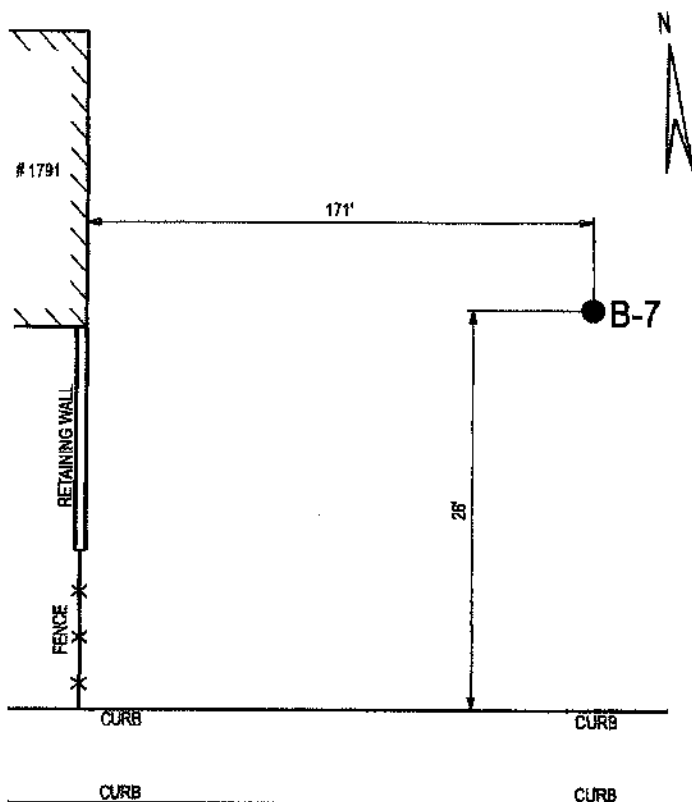
GROUND WATER RECORD

DATE	TIME	DEPTH
XXX	XXX	XXX
XXX	XXX	XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊕ Previously Done Test Boring (see job as noted)
- ⊗ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⚠ Caution Symbol
- ⊙ Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



INSPECTORS REMARKS:

DEPTH
in feet

0

5

10

15

20

25

30

35

40

45

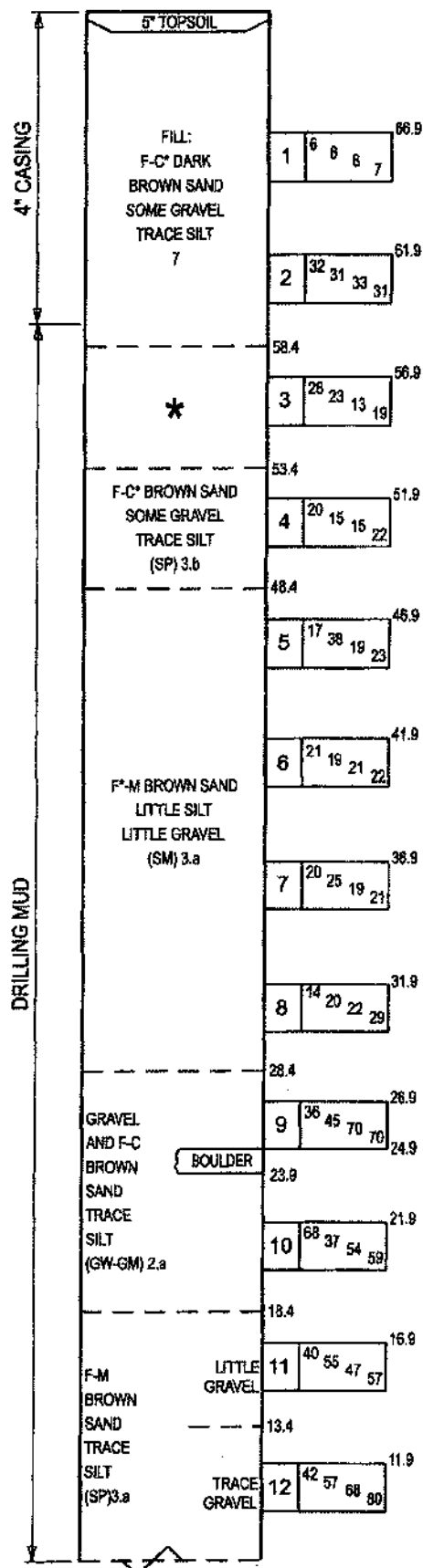
50

55

60

B-7

SURF. EL. 71.9





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LOUIS BERGER AND ASSOC., P.C.

199 WATER STREET, 23RD FLOOR, NEW YORK CITY, NY 10038

BOROUGH: BROOKLYN JOB # 3838 BORING # B-7
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANALE

CONTRACTOR: ADT

DRILLER: J. CAMPBELL

HELPER: S. VERNON

BORING LOG

SHEET 2 OF 2

Date Started: 12/8/2008

Date Finished: 12/9/2008

Depth of Hole: 100'

Rig Type: XXX

Casing Size: XXX

Spoon Type: 2" od

Drilling Bit Type: R.BIT

Depth of Casing: 13'

Weight of Hammer: For Casing: 300 lb;

Weight of Hammer: For Spoon: 140 lb;

Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA

PC # XXX

Asphalt: XXX

Concrete: XXX

Wellpoint Installed: XXX

PVC Riser: XXX

Screen: XXX

GROUND WATER RECORD

DATE TIME DEPTH

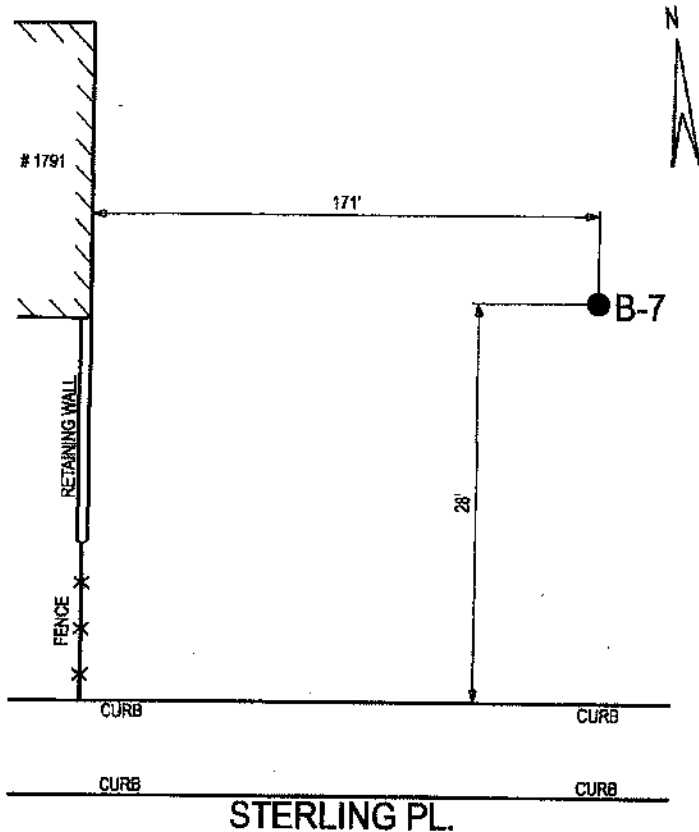
XXX XXX XXX

XXX XXX XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊕ Previously Done Test Boring (see job as noted)
- ⊗ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⚠ Caution Symbol
- Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



INSPECTOR'S REMARKS:

DEPTH
In feet

65

70

75

80

85

90

95

100

105

110

115

120

125

B-7

CON'D

DRILLING MUD

F-M BROWN SAND
TRACE GRAVEL
TRACE SILT
(SP) 3.a

13	26	36	31	42	6.9
14	36	39	38	40	1.9
15	30	41	43	40	3.1
16	40	44	35	45	8.1
17	44	43	45	40	13.1
18	33	44	37	38	18.1
19	37	41	55	45	23.1
20	49	54	49	40	28.1
					30.1

* FILL:
F-C LIGHT
BROWN SAND
AND GRAVEL
TRACE SILT
7



DIVISION OF TECHNICAL SUPPORT
BUREAU OF ENVIRONMENTAL
& GEOTECHNICAL SERVICE

30-30 THOMSON AVE, 5th FLOOR
LONG ISLAND CITY, N.Y., 11101

LOUIS BERGER AND ASSOC., P.C.

199 WATER STREET, 23RD FLOOR, NEW YORK CITY, NY 10038

BOROUGH: BROOKLYN JOB # 3838 BORING # B-8

PROJECT: FIREHOUSE FOR RESCUE 2

LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANLALE

CONTRACTOR: ADT

DRILLER: J. CAMPBELL

HELPER: S. VERNON

BORING LOG

SHEET 1 OF 1

Date Started: 12/3/2008

Date Finished: 12/4/2008

Depth of Hole: 50'

Rig Type: CME 75

Casing Size: XXX

Spoon Type: 2" od

Drilling Bit Type: R.BIT

Depth of Casing: XXX

Weight of Hammer: For Casing: 300 lb;

Weight of Hammer: For Spoon: 140 lb;

Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA

PC # XXX

Asphalt: XXX

Concrete: XXX

Wellpoint Installed: XXX

PVC Riser: XXX

Screen: XXX

GROUND WATER RECORD

DATE TIME DEPTH

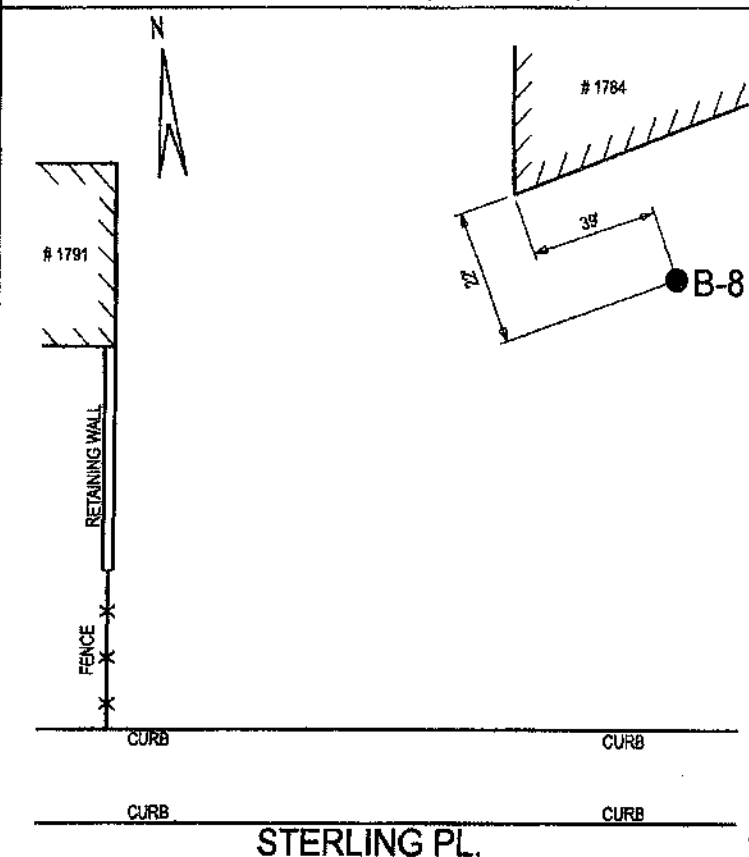
XXX XXX XXX

XXX XXX XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊙ Previously Done Test Boring (see job as noted)
- ⊕ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⊙ Caution Symbol Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



INSPECTOR'S REMARKS:

DEPTH
in feet
0

5

10

15

20

25

30

35

40

45

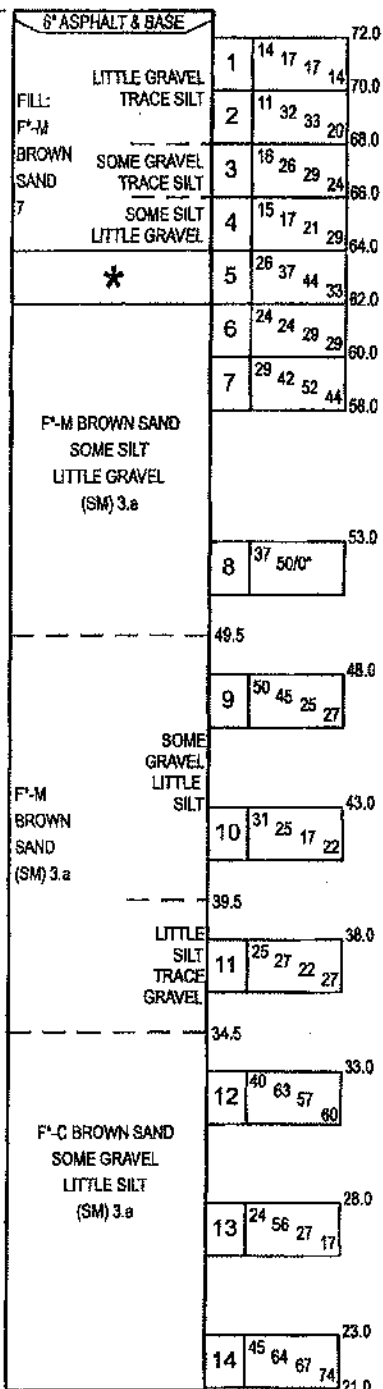
50

55

60

B-8

SURF. EL. 73.0



* GRAVEL
TRACE DARK GRAY SILT
(GF) 2.0



**DIVISION OF TECHNICAL SUPPORT
BUREAU OF ENVIRONMENTAL
& GEOTECHNICAL SERVICE**

30-30 THOMSON AVE, 5th FLOOR
LONG ISLAND CITY, N.Y., 11101

LOUIS BERGER AND ASSOC., P.C.

199 WATER STREET, 23RD FLOOR, NEW YORK CITY, NY 10038

BOROUGH: BROOKLYN JOB # 3838 BORING # B-10
PROJECT: FIREHOUSE FOR RESCUE 2
LOCATION: STERLING PL. BETWEEN HOWARD AVE. AND SARATOGA AVE.

INSPECTOR: JOHN LACANALE
CONTRACTOR: ADT
DRILLER: J. CAMPBELL
HELPER: S. VERNON

BORING LOG

SHEET 1 OF 1

Date Started: 12/4/2008

Date Finished: 12/5/2008

Depth of Hole: 50'
Rig Type: CME 75
Casing Size: XXX

Spoon Type: 2" od
Drilling Bit Type: R.BIT
Depth of Casing: XXX

Weight of Hammer: For Casing: 300 lb;
Weight of Hammer: For Spoon: 140 lb;
Type of Hammer: ROPE-CATHEAD

PAVEMENT CORE DATA

PC # XXX
Asphalt: XXX
Concrete: XXX

Wellpoint Installed: XXX

PVC Riser: XXX
Screen: XXX

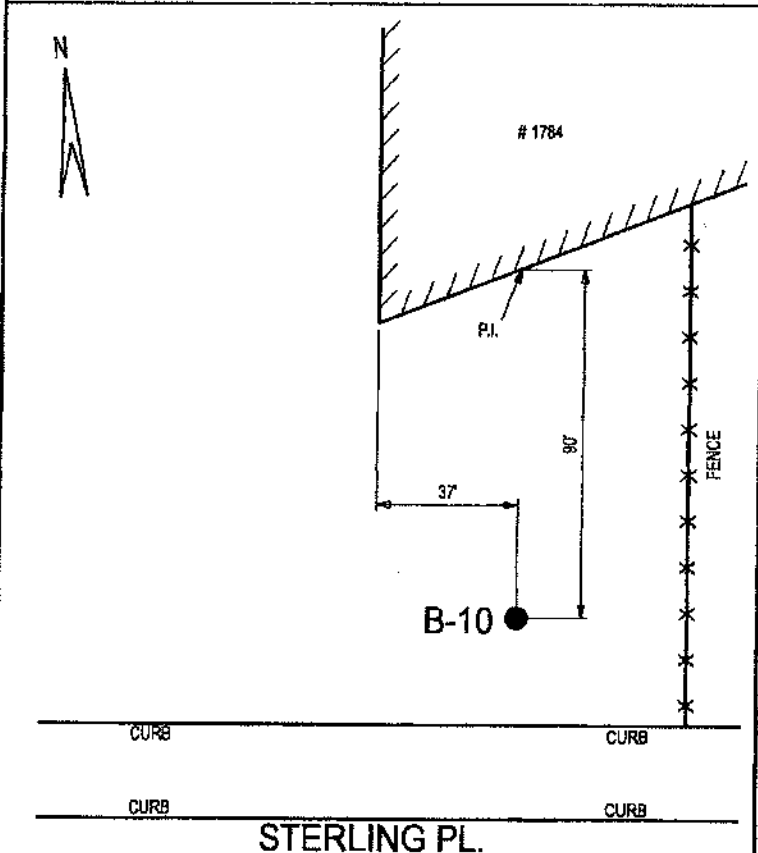
GROUND WATER RECORD

DATE	TIME	DEPTH
XXX	XXX	XXX
XXX	XXX	XXX

LEGEND

- Test Boring
- Test Boring (Failed Attempt)
- ⊕ Previously Done Test Boring (see job as noted)
- ⊗ Environmental Test Boring
- Pavement Core
- ▲ Test Boring With Observation Well
- ⚠ Caution Symbol
- ⊗ Pavement Core and Test Boring (at same location)

LOCATION PLAN (NOT TO SCALE)



INSPECTORS REMARKS:

DEPTH
in feet

0

5

10

15

20

25

30

35

40

45

50

55

60

B-10

SURF. EL. 71.2

6" ASPHALT & BASE

FILL:
F-C DARK BROWN SAND
SOME GRAVEL
TRACE SILT
7

F-M BROWN SAND
SOME GRAVEL
TRACE GRAVEL
LITTLE SILT (SM) 3.a

1	14	10	14	15	70.2
2	20	27	22	32	68.2
3	16	19	18	20	66.2
4	16	19	41	27	84.2
5	16	19	20	30	82.2
6	24	24	28	21	60.2
7	19	26	29	24	58.2
8	30	31	38	38	56.2

*

LITTLE GRAVEL

F-M BROWN SAND
SOME GRAVEL
TRACE SILT (SM) 3.a

TRACE GRAVEL

9	18	16	23	12	52.7
10	17	20	15	19	51.2
11	28	29	29	20	46.2
12	20	30	30	23	41.2
13	18	13	17	17	36.2
14	21	17	14	16	31.2
15	48	68	52	52	26.2
					21.2
					19.2

* F-M BROWN SAND
SOME GRAVEL
LITTLE SILT
(SP-SM) 3.a

DRILLING MUD

APPENDIX B
LABORATORY TEST RESULTS

Results of Geotechnical Laboratory Testing
Firehouse for Rescue 2, Sterling Pl. between Howard and Saratoga Avenues
Borough of Brooklyn

CONTENTS

Page

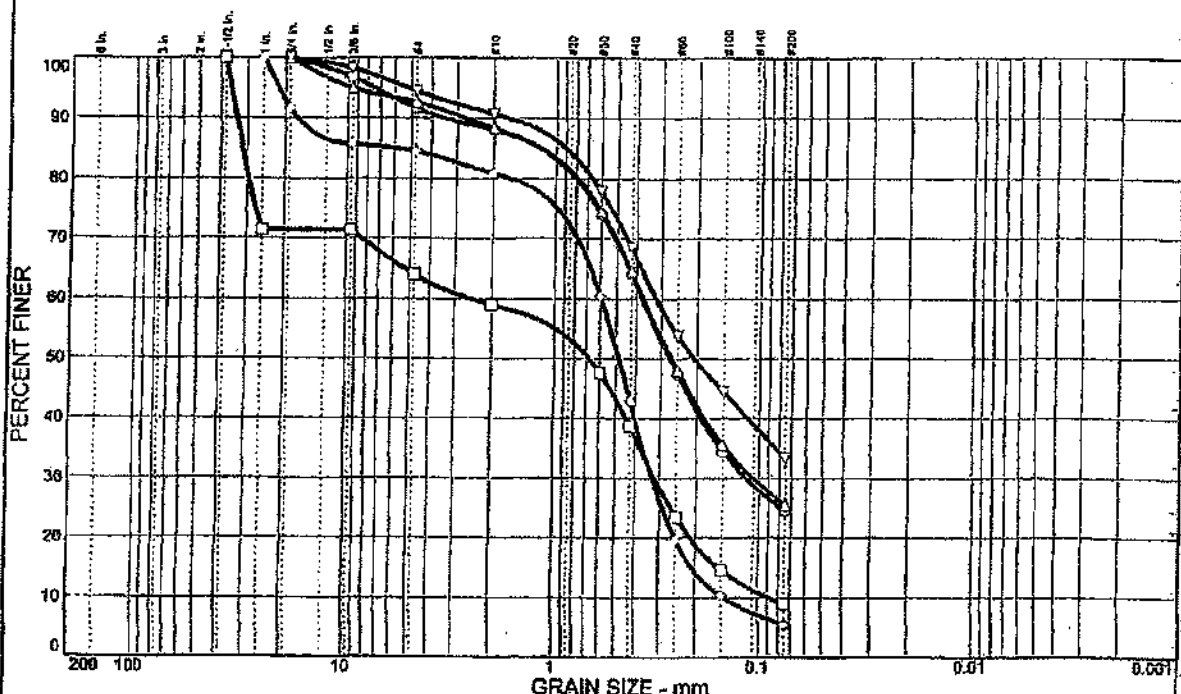
Laboratory Testing Data Summary.....	GT-1
Particle Size Distribution	GT-2 to GT-7
Chemical Results	GT-8 to GT-9

LBA Proj No. JG880F7 / DDC Proj. No. F175RES2 SES# 3838
FIREHOUSE FOR RESCUE 2, BROOKLYN
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL IDENTIFICATION TESTS			
			USCS SYMBOL (1)	SIEVE MINUS No. 200	CHLORIDE CONTENT (PPM)	SULFATE CONTENT (PPM)
B-1	S-7				189.3	187.5
B-1	S-9	20-22	SM	24.5		
B-1	S-12	35-37	SP-SM	9		
B-2	S-3				260.3	87.5
B-2	S-6	30-32	SM	25.5		
B-2	S-9	50-52	SP-SM	5.5		
B-3	S-3	5-7	SM	33.4		
B-3	S-8				236.7	230.0
B-3	S-9	20-22	SM	23.7		
B-3	S-13	40-42	GM	15.5		
B-4	S-5	25-27	GM	14.8		
B-4	S-8	40-42	SM	22.1		
B-5	S-3				284.0	177.5
B-5	S-7	12-14	SM	22.5		
B-5	S-10	25-27	SM	24.1		
B-6	S-3				236.7	230.0
B-6	S-6	30-32	SM	24.9		
B-6	S-9	50-52	SW-SM	9.2		
B-7	S-3	15-17	SP-SM	7.0		
B-7	S-5	25-27	SM	17.6		
B-7	S-9	45-47	GW-GM	8.5		
B-8	S-4	8-10	SM	26.3		
B-8	S-8	20-22	SM	21.4		
B-8	S-11				213.0	180.0
B-9	S-1	5-7	SM	25.8		
B-9	S-2				307.7	270.0
B-9	S-5	25-27	SM	17.4		
B-9	S-6	30-32	SM	22.5		
B-9	S-17	85-87	SP-SM	11.1		
B-10	S-5	10-12	SP	14.2		
B-10	S-8	15-17	SP-SM	10.7		
B-10	S-11	30-32	SM	26.0		

Note: (1) USCS symbol based on visual observation and Sieve reported.

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND				% SILT		% CLAY	
○	0.0	8.4	67.1				24.5			
□	0.0	36.0	55.0				9.0			
△	0.0	7.4	67.1				25.5			
◇	0.0	15.5	79.0				5.5			
▽	0.0	5.5	61.1				33.4			
	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			1.19	0.373	0.272	0.115				
□			31.6	2.53	0.678	0.318	0.194	0.0874	0.46	28.90
△			1.18	0.369	0.268	0.107				
◇			5.85	0.593	0.486	0.327	0.207	0.144	1.25	4.12
▽			0.898	0.318	0.208					

MATERIAL DESCRIPTION

- Brown Silty sand
- Brown Poorly graded sand with silt and gravel
- △ Brown Silty sand
- ◇ Brown Poorly graded sand with silt and gravel
- ▽ Brown Silty sand

USCS

AASHTO

- SM
- SP-SM
- SM
- SP-SM
- SM

Project No. 08-67102-01 Client: The Louis Berger Group, Inc.

Project: Lab Testing-NYCDDC

- Source: 3838 Firehouse Rescue Sample No.: B-1/S-9 Elev./Depth: 20-22
- Source: 3838 Firehouse Rescue Sample No.: B-1/S-12 Elev./Depth: 35-37
- △ Source: 3838 Firehouse Rescue Sample No.: B-2/S-6 Elev./Depth: 30-32
- ◇ Source: 3838 Firehouse Rescue Sample No.: B-2/S-9 Elev./Depth: 50-52
- ▽ Source: 3838 Firehouse Rescue Sample No.: B-3/S-3 Elev./Depth: 5-7

Remarks:

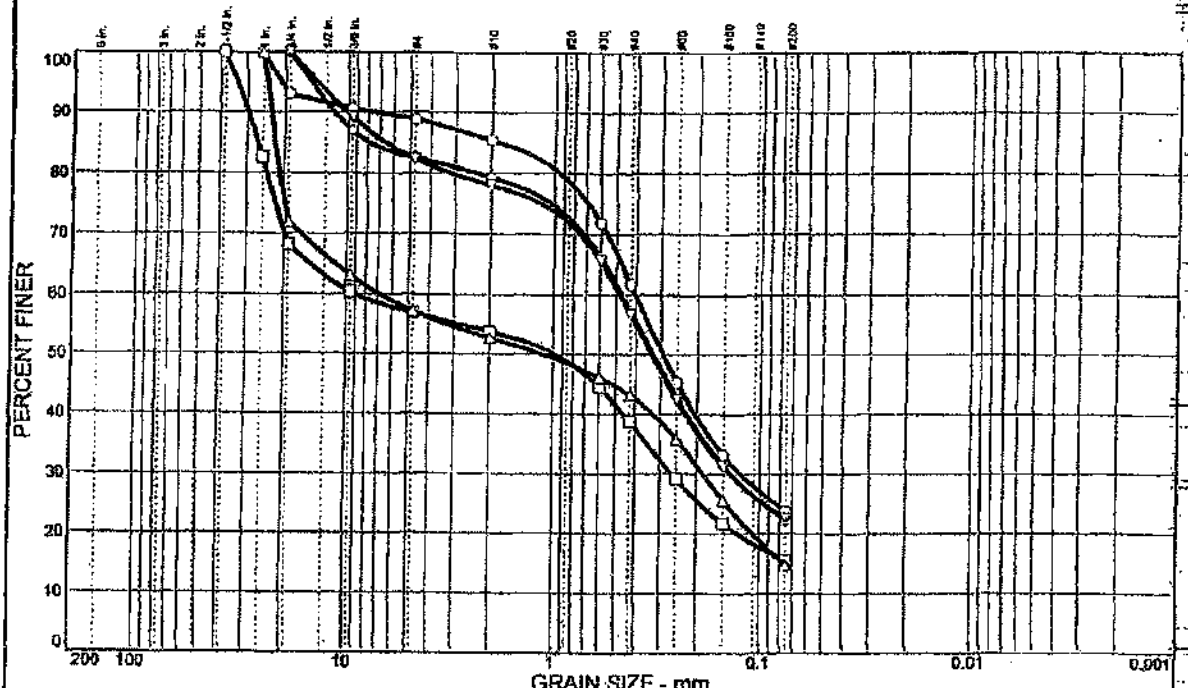
-
-
- △
- ◇
- ▽



Converse Consultants

Date 12/31/08

Particle Size Distribution Report



% GOBBLES		% GRAVEL		% SAND		% SILT		% CLAY	
○	0.0		11.2		65.1		23.7		
□	0.0		43.1		41.4		15.5		
△	0.0		42.8		42.4		14.8		
◇	0.0		17.4		60.5		22.1		
▽	0.0		17.6		59.9		22.5		
LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _u	C _u
○		1.83	0.403	0.293	0.124				
□		26.7	8.99	0.977	0.262				
△		22.1	6.87	1.11	0.186	0.0761			
◇		7.81	0.469	0.327	0.138				
▽		6.54	0.479	0.333	0.140				

MATERIAL DESCRIPTION						USCS	AASHTO
○	Brown Silty sand					SM	
□	Brown Silty gravel with sand					GM	
△	Brown Silty gravel with sand					GM	
◇	Brown Silty sand with gravel					SM	
▽	Brown Silty sand with gravel					SM	

Project No. 08-67102-01		Client: The Louis Berger Group, Inc.		Remarks: ○ □ △ ◇ ▽
Project: Lab Testing-NYCDDC				
○	Source: 3838 Firehouse Rescue Sample No.: B-3/S-9	Elev./Depth: 20-22		
□	Source: 3838 Firehouse Rescue Sample No.: B-3/S-13	Elev./Depth: 40-42		
△	Source: 3838 Firehouse Rescue Sample No.: B-4/S-5	Elev./Depth: 25-27		
◇	Source: 3838 Firehouse Rescue Sample No.: B-4/S-8	Elev./Depth: 40-42		
▽	Source: 3838 Firehouse Rescue Sample No.: B-5/S-7	Elev./Depth: 12-14		

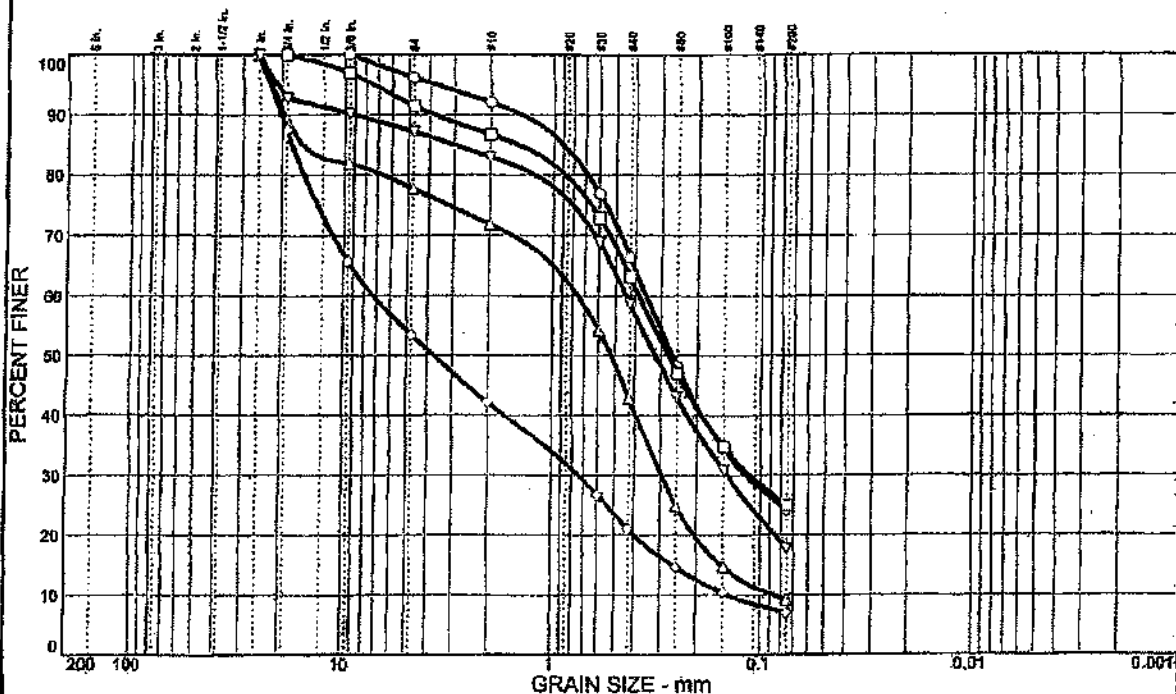


Converse Consultants

Date 12/31/08

GT-4

Particle Size Distribution Report



% COBBLES		% GRAVEL		% SAND			% SILT		% CLAY	
○	0.0	3.8		72.1			24.1			
□	0.0	8.5		66.6			24.9			
△	0.0	22.3		68.5			9.2			
◇	0.0	46.5		46.5			7.0			
▽	0.0	12.8		69.6			17.6			
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.893	0.354	0.264	0.118				
□			1.46	0.383	0.277	0.112				
△			15.8	0.752	0.523	0.295	0.153	0.0868	1.34	8.66
◇			17.9	7.19	3.70	0.738	0.260	0.141	0.54	51.02
▽			3.00	0.443	0.320	0.144				

MATERIAL DESCRIPTION

- Brown Silty sand
- Brown Silty sand
- △ Brown Well-graded sand with silt and gravel
- ◇ Light brown poorly graded sand with silt and gravel
- ▽ Brown silty sand

USCS

- SM
- SM
- SW-SM
- SP-SM
- SM

AASHTO

Project No. 08-67102-01 Client: The Louis Berger Group, Inc.

Project: Lab Testing-NYCDDC

- Source: 3838 Firehouse Rescue Sample No.: B-5/S-10 Elev./Depth: 25-27
- Source: 3838 Firehouse Rescue Sample No.: B-6/S-6 Elev./Depth: 30-32
- △ Source: 3838 Firehouse Rescue Sample No.: B-6/S-9 Elev./Depth: 50-52
- ◇ Source: 3838 Firehouse Rescue Sample No.: B-7/S-3 Elev./Depth: 15-17
- ▽ Source: 3838 Firehouse Rescue Sample No.: B-7/S-5 Elev./Depth: 25-27

Remarks:

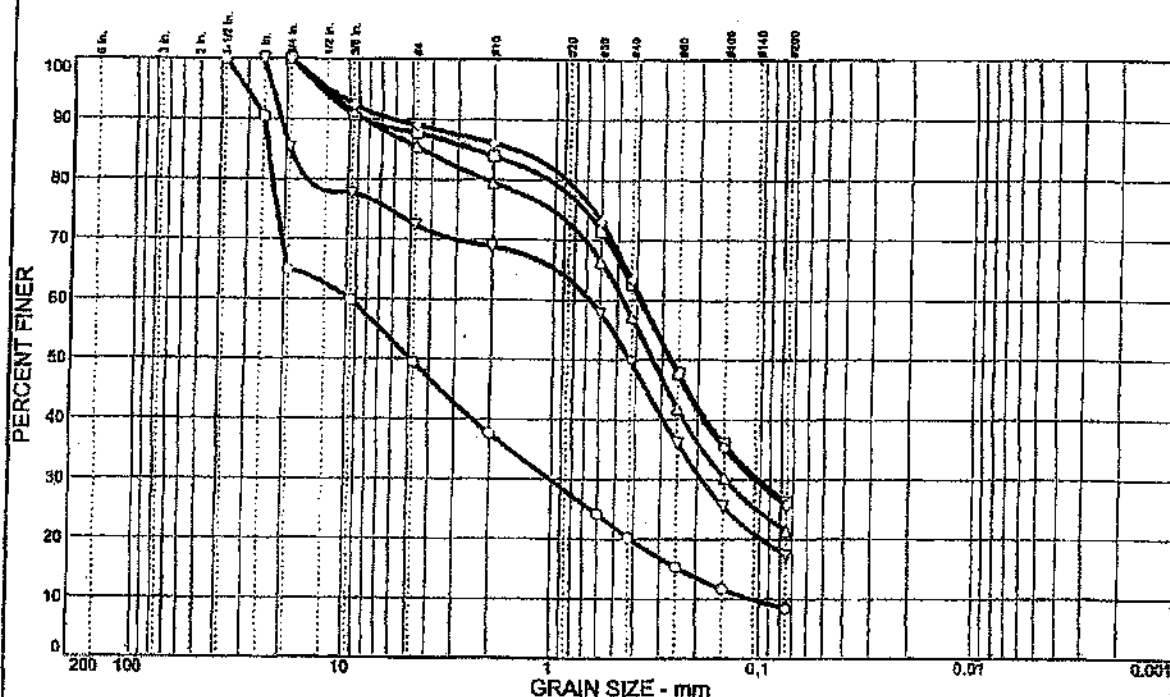
-
-
- △
- ◇
- ▽



Converse Consultants

Date 12/31/08

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND				% SILT		% CLAY	
○	0.0	50.6	40.9				8.5			
□	0.0	12.3	61.4				26.3			
△	0.0	14.6	64.0				21.4			
◇	0.0	11.0	63.2				25.8			
▽	0.0	27.6	55.0				17.4			
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			24.1	9.61	4.94	1.02	0.241	0.107	1.00	89.50
□			2.50	0.386	0.271	0.102				
△			4.49	0.467	0.333	0.147				
◇			1.58	0.380	0.273	0.106				
▽			19.0	0.670	0.430	0.190				

MATERIAL DESCRIPTION

- ☐ Light brown well-graded gravel with silt and sand
☐ Brown silty sand
 Brown silty sand
 Brown silty sand
☒ Brown silty sand with gravel

USCS

AASHTO

GW-GM
 SM
 SM
 SM
 SM

Project No. 08-67102-01 Client: The Louis Berger Group, Inc.

Project: Lab Testing-NYCDDC

- ☐ Source: 3838 Firehouse Rescue Sample No.: B-7/S-9 Elev./Depth: 45-47
☐ Source: 3838 Firehouse Rescue Sample No.: B-8/S-4 Elev./Depth: 8-10
 Source: 3838 Firehouse Rescue Sample No.: B-8/S-8 Elev./Depth: 20-22
 Source: 3838 Firehouse Rescue Sample No.: B-9/S-1 Elev./Depth: 5-7
☒ Source: 3838 Firehouse Rescue Sample No.: B-9/S-5 Elev./Depth: 25-27

Remarks:

- ☐
☐

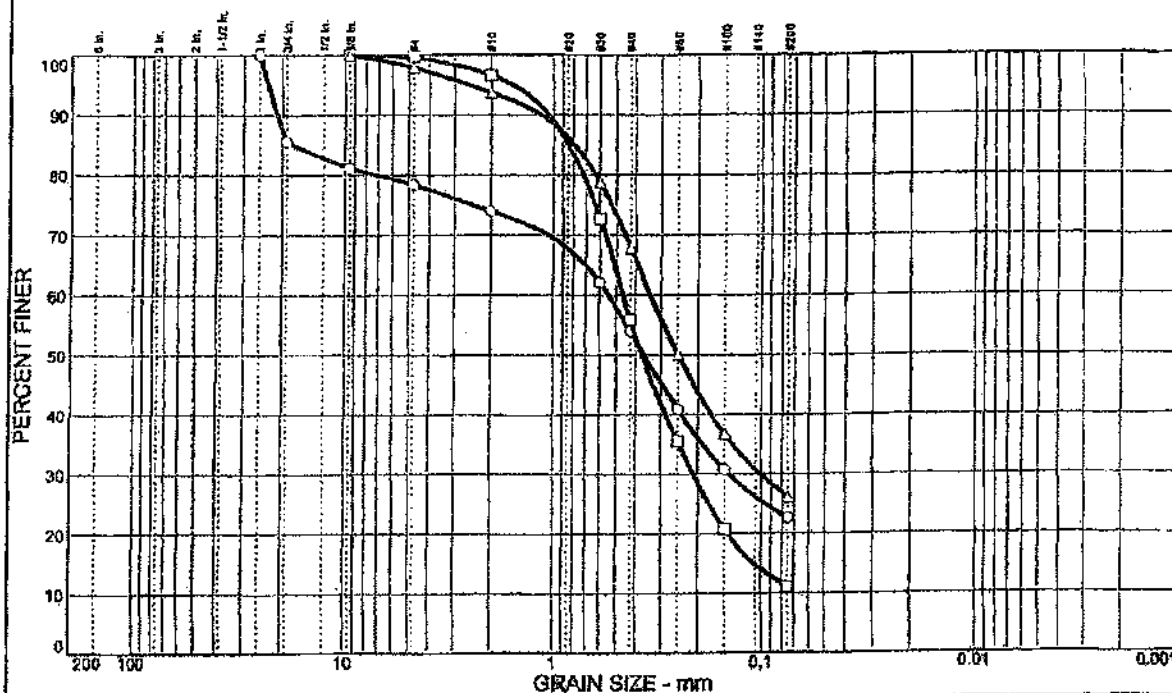
☒



Converse Consultants

Date 12/31/08

Particle Size Distribution Report



GRAVELLY SAND WITH SILT AND CLAY										
	% COBBLES	% GRAVEL		% SAND			% SILT		% CLAY	
○	0.0	21.6		55.9			22.5			
□	0.0	0.3		88.6			11.1			
△	0.0	2.1		71.9			26.0			
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			17.6	0.544	0.363	0.143				
□			0.846	0.462	0.372	0.211	0.108			
△			0.792	0.338	0.249	0.101				

MATERIAL DESCRIPTION

- Brown silty sand with gravel
 □ Brown poorly graded sand with silt
 △ Brown Silty sand

USOS

SM
 SP-SM
 SM

AASHTO

Project No. 08-67102-01 Client: The Louis Berger Group, Inc.

Project: Lab Testing-NYCDDC

○ Source: 3838 Firehouse Rescue Sample No.: B-9/S-6 Elev./Depth: 30-32

□ Source: 3838 Firehouse Rescue Sample No.: B-9/S-17 Elev./Depth: 85-87

△ Source: 3838 Firehouse Rescue Sample No.: B-10/S-11 Elev./Depth: 30-32

Remarks:

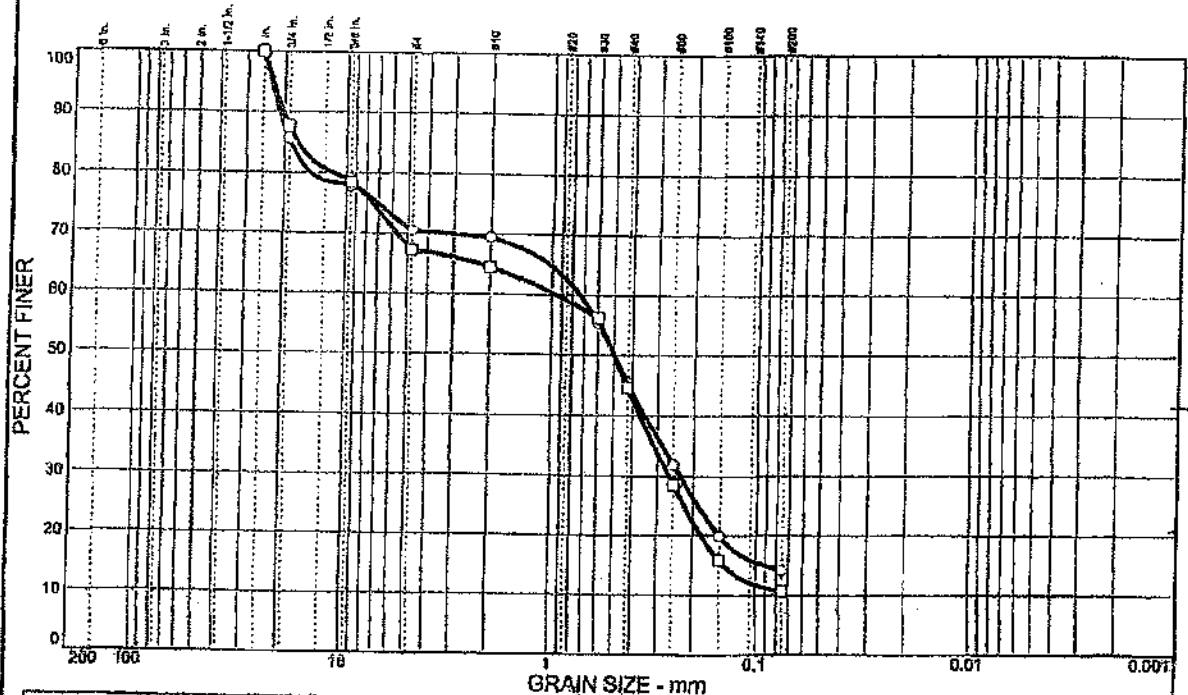
○
 □
 △



Converse Consultants

Date 12/31/08

Particle Size Distribution Report



% COBBLES		% GRAVEL		% SAND		% SILT		% CLAY	
<input type="checkbox"/>	0.0		29.5		56.3		14.2		
<input type="checkbox"/>	0.0		32.7		56.6		10.7		
<input checked="" type="checkbox"/>	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c
<input type="checkbox"/>			18.7	0.735	0.497	0.232	0.0908		
<input type="checkbox"/>			17.3	0.954	0.499	0.263	0.142		

MATERIAL DESCRIPTION

- ☐ Brown Silty sand with gravel
☐ Brown Poorly graded sand with silt and gravel

USCS

AASHTO

 SM
 SP-SM

Project No. 08-67102-01 Client: The Louis Berger Group, Inc.

Project: Lab Testing-NYCDDC

☐ Source: 3838 Firehouse Rescue Sample No.: B-10/S-5 Elev./Depth: 10-12

☐ Source: 3838 Firehouse Rescue Sample No.: B-10/S-8 Elev./Depth: 15-17

Remarks:

☐
☐


Converse Consultants

Figure 1/2/09

Technion, Inc.
Testing and Research Laboratories

Client : The Louis Berger Group
Project : Firehouse Rescue 2

Date Received : 12/22/08
Date Analyzed : 12/22/08

Test Results
Chloride

Method: 9250
Soil: Sand

Lab ID	Boring Number	Sample Number	Result	MDL
8391-1	B3	s8	236.67	3.0
8391-2	B5	S3	284.00	3.0
8391-3	B8	S11	213.00	3.0
8391-4	B9	S2	307.67	3.0
8391-5	B1	S7	189.34	3.0
8391-6	B2	S3	260.34	3.0
8391-7	B6	S3	236.67	3.0

Test results are in mg/kg (ppm), unless specified
N.D. : Not Detected
MDL : Minimum Detection Limit

GT-9

Technion, Inc.
Testing and Research Laboratories

Client : The Louis Berger Group
Project : Firehouse Rescue 2

Date Received : 12/22/08
Date Analyzed : 12/22/08

Test Results
Sulfate

Method: 9035-38
Soil: Sand

Lab ID	Boring Number	Sample Number	Result	MDL
8391-1	B3	s8	230.0	5.0
8391-2	B5	S3	177.5	5.0
8391-3	B8	S11	180.0	5.0
8391-4	B9	S2	270.0	5.0
8391-5	B1	S7	187.5	5.0
8391-6	B2	S3	87.5	5.0
8391-7	B6	S3	230.0	5.0

Test results are in mg/kg (ppm), unless specified
N.A. - Not Applicable
MDL : Minimum Detection Limit

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April 9, 2015
YU's Project #1500400
YU-PB Contract #20121440891

Mr. Jeffrey Au, P.E.
Bureau of Environmental & Geotechnical Services

New York City Department of Design + Construction
30-30 Thomson Avenue
Long Island City, New York 11101

**RE: CAPIS ID# F175RES2
FDNY Rescue 2 Firehouse
1815 Sterling Place (between Howard Avenue and Saratoga Avenue)
Brooklyn, NY**

**Task ID# 10117 Geotechnical II: Project Oversight
SES-3838B, J-3595, Geothermal Test Well with Natural Gamma Ray Test,
72-hour Thermal Conductivity Test, Geotechnical Laboratory Test**

Dear Mr. Au:

As part of YU-Parsons Brinckerhoff Joint Venture (JV) deliverables for the referenced project, attached please find copies of the rock core photographic log, geotechnical laboratory test results, 72-hour thermal conductivity test results, and natural gamma ray test results for your use. The testing programs were previously approved by your office. The actual laboratory tests were performed by our subconsultant, Converse Consultants. Services for the 72-hour thermal conductivity test and natural gamma ray test were performed by subconsultants engaged by Aquifer Drilling and Testing, Inc. If you have any questions, please feel free to contact us.

Very truly yours,
YU-PARSONS BRINCKERHOFF, JV



Andrew Leung, P.E.
Contract Executive



Attachments: Appendix A – Rock Core Photographic Log
Appendix B – Geotechnical Laboratory Test Results
Prepared by Converse Consultants
Appendix C – 72-Hour Thermal Conductivity Test Results
Appendix D – Natural Gamma Ray Test Results

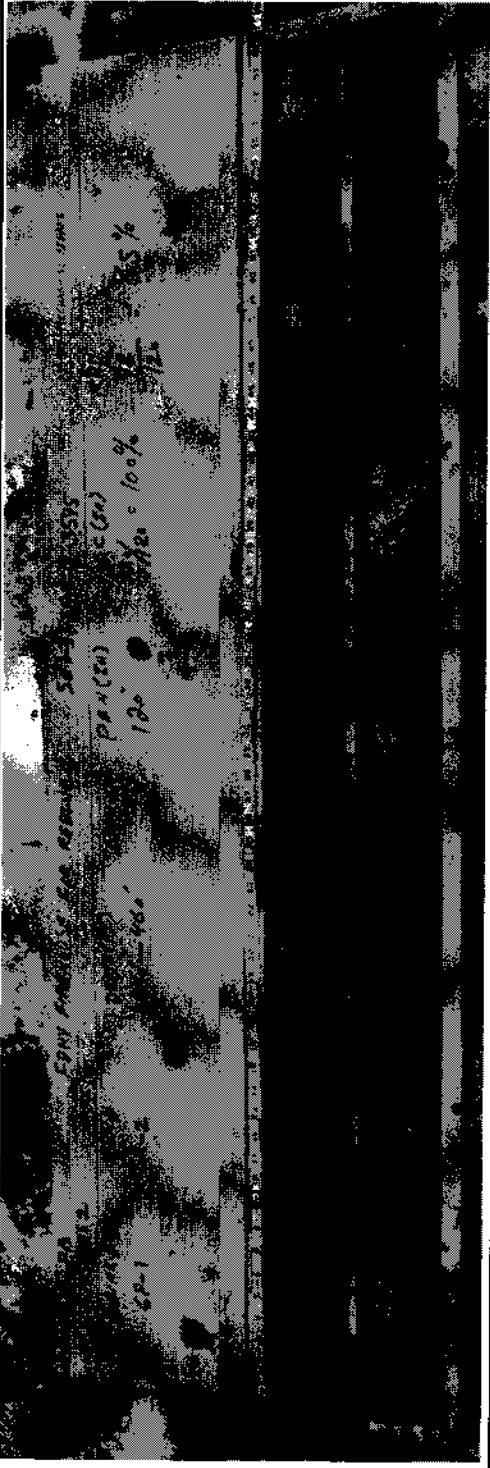

cc: Rich Meserole / DDC



P:\1515004 (FDNY Firehouse for Rescue 2 -Geothermal)\(2) Outbound\2015-04-09 final ROB\Letter prep\2015-04-09 F175RES2 FDNY Firehouse for Rescue 2 Geothermal - Letter Only.docx

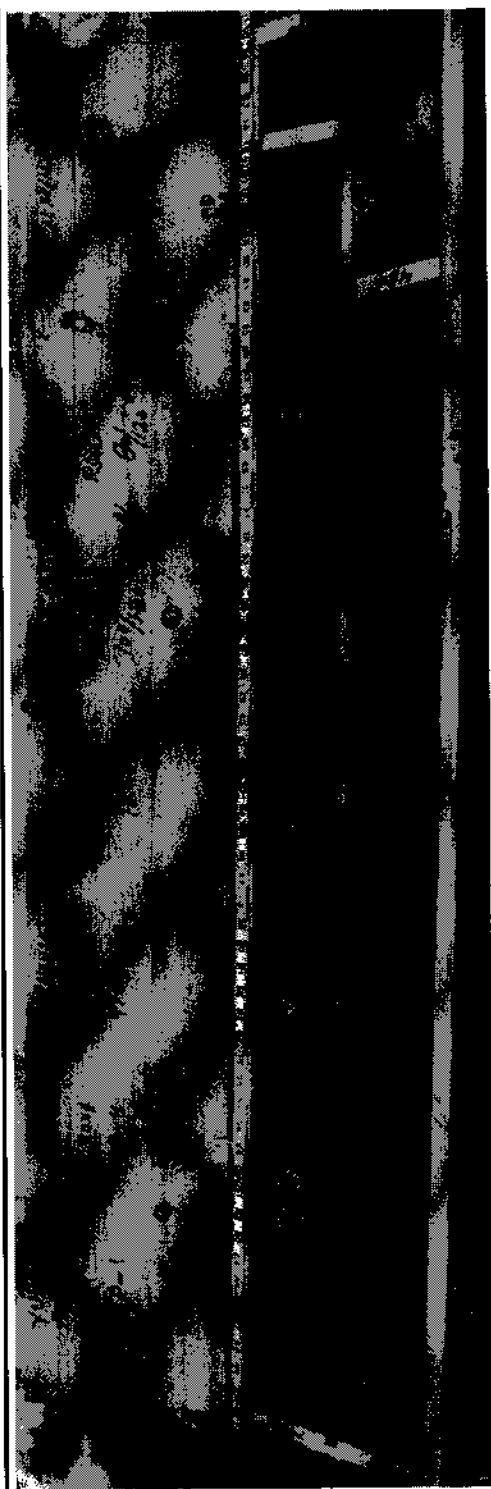
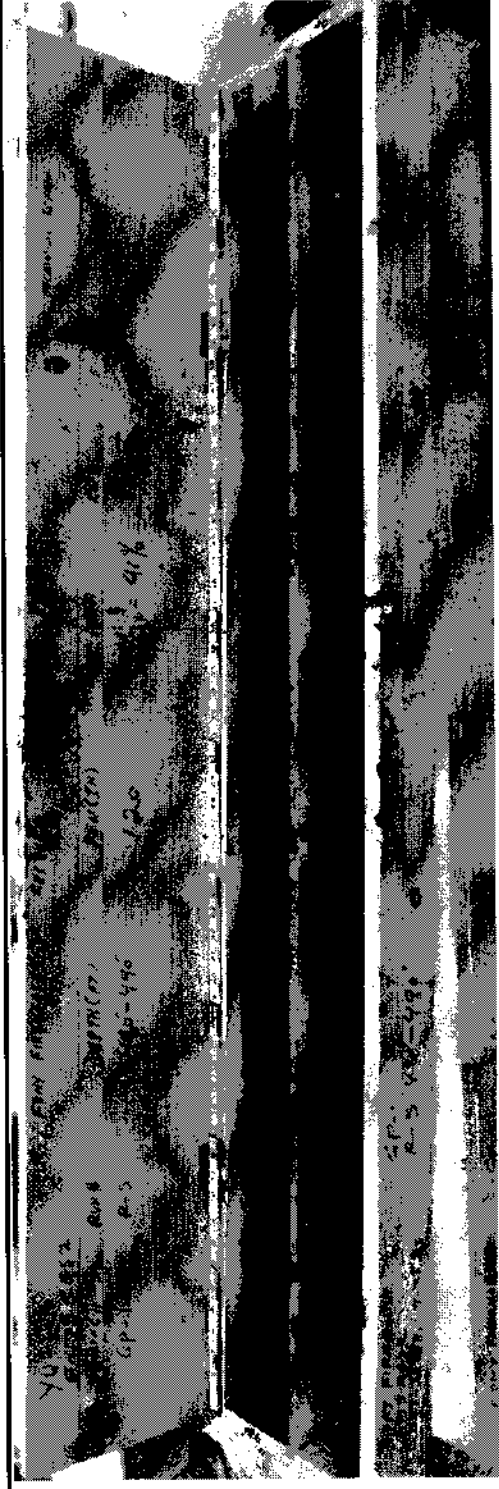
APPENDIX A


Rock Core Photographic Log

DDC Project No: F175RES2		ROCK CORE PHOTOGRAPHIC LOG	
 NEW YORK CITY DEPARTMENT OF DESIGN & CONSTRUCTION		Project Name: FDNV Rescue 2 Firehouse - Geothermal Test Well Installation Location: 1815 Sterling Place, Brooklyn NY SES No.: 3838B, J-3595	
 PARSONS BRINCKERHOFF <small>A Joint Venture</small>			


Boring No.		
GP-1	R2	
Boring No.		
GP-1	R3	

DDC Project No: F175RES2		ROCK CORE PHOTOGRAPHIC LOG	
 NEW YORK CITY DEPARTMENT OF DESIGN & CONSTRUCTION	Project Name: FDNY Rescue 2 Firehouse - Geothermal Test Well Installation Location: 1815 Sterling Place, Brooklyn NY SES No.: 3838B, J-3595		
	 PARSONS BRINCKERHOFF <small>A JACO VANUUR</small>		

Boring No.		
GP-1	R4	
Boring No.		
GP-1	R5	

DDC Project No: F175RES2		ROCK CORE PHOTOGRAPHIC LOG	
	Project Name: FDNY Rescue 2 Firehouse - Geothermal Test Well Installation		
	Location: 1815 Sterling Place, Brooklyn NY		
	SES No.: 3838B, J-3595		

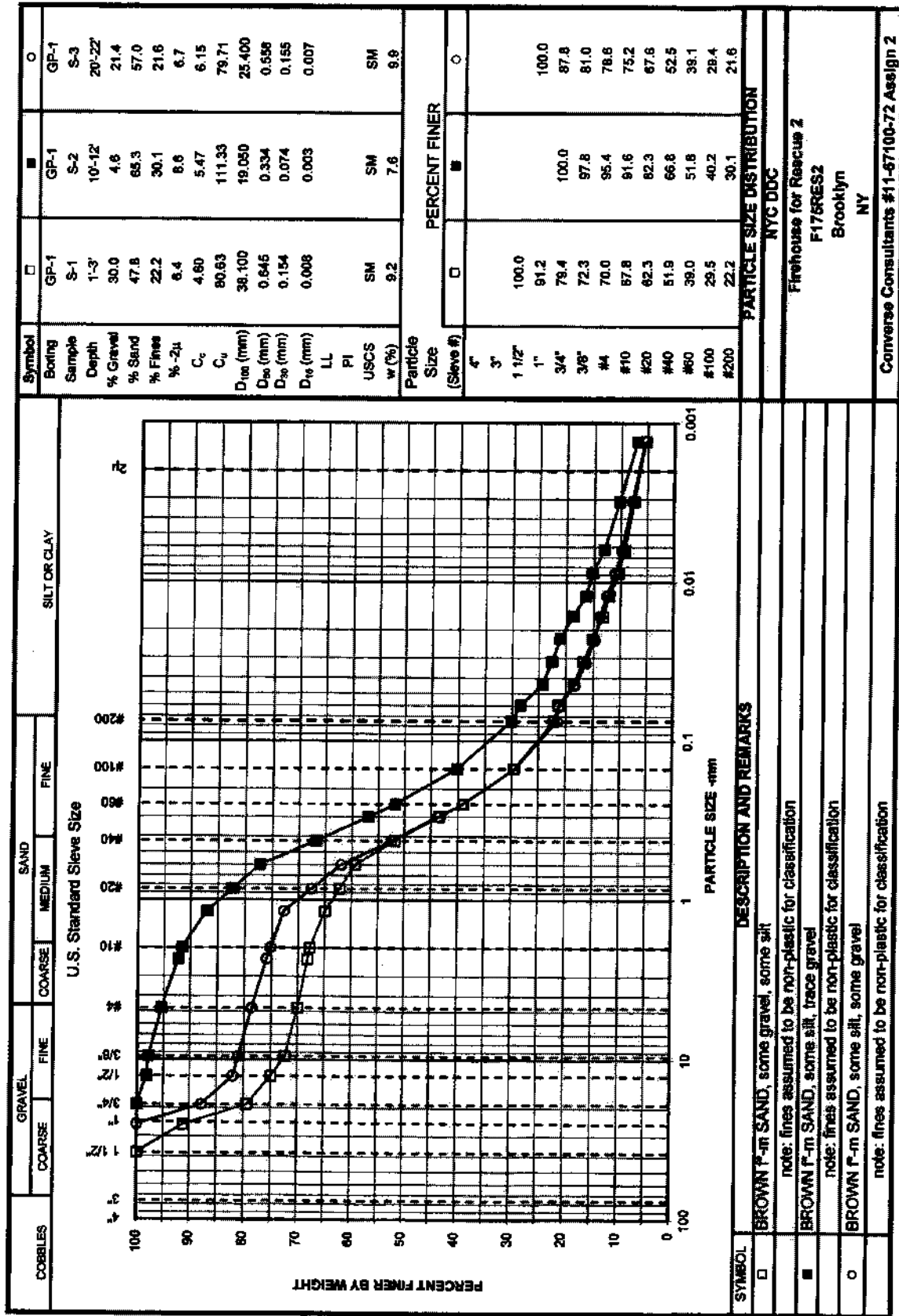


Boring No.		
GP-1	R6	

APPENDIX B

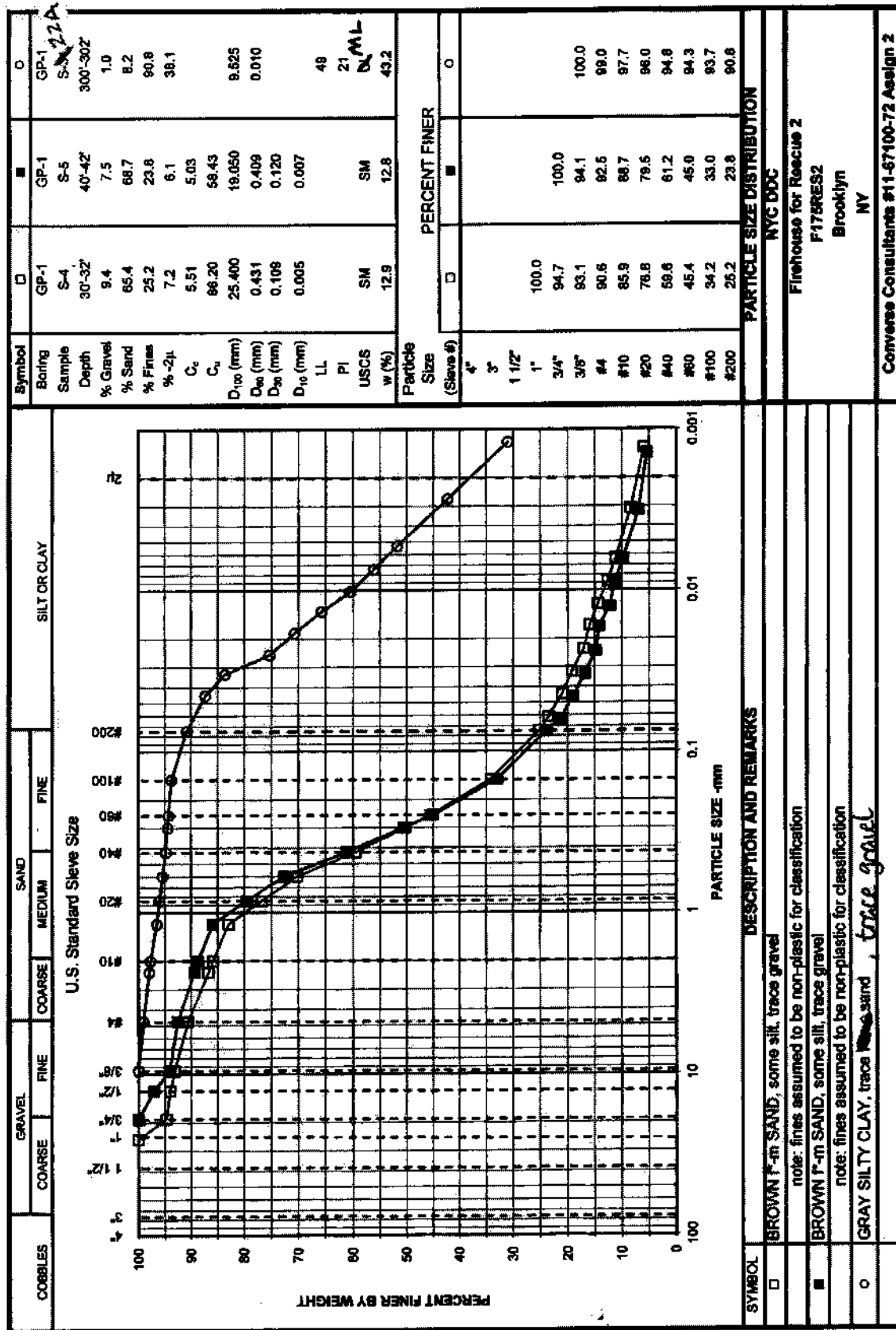
Geotechnical Laboratory Test Results

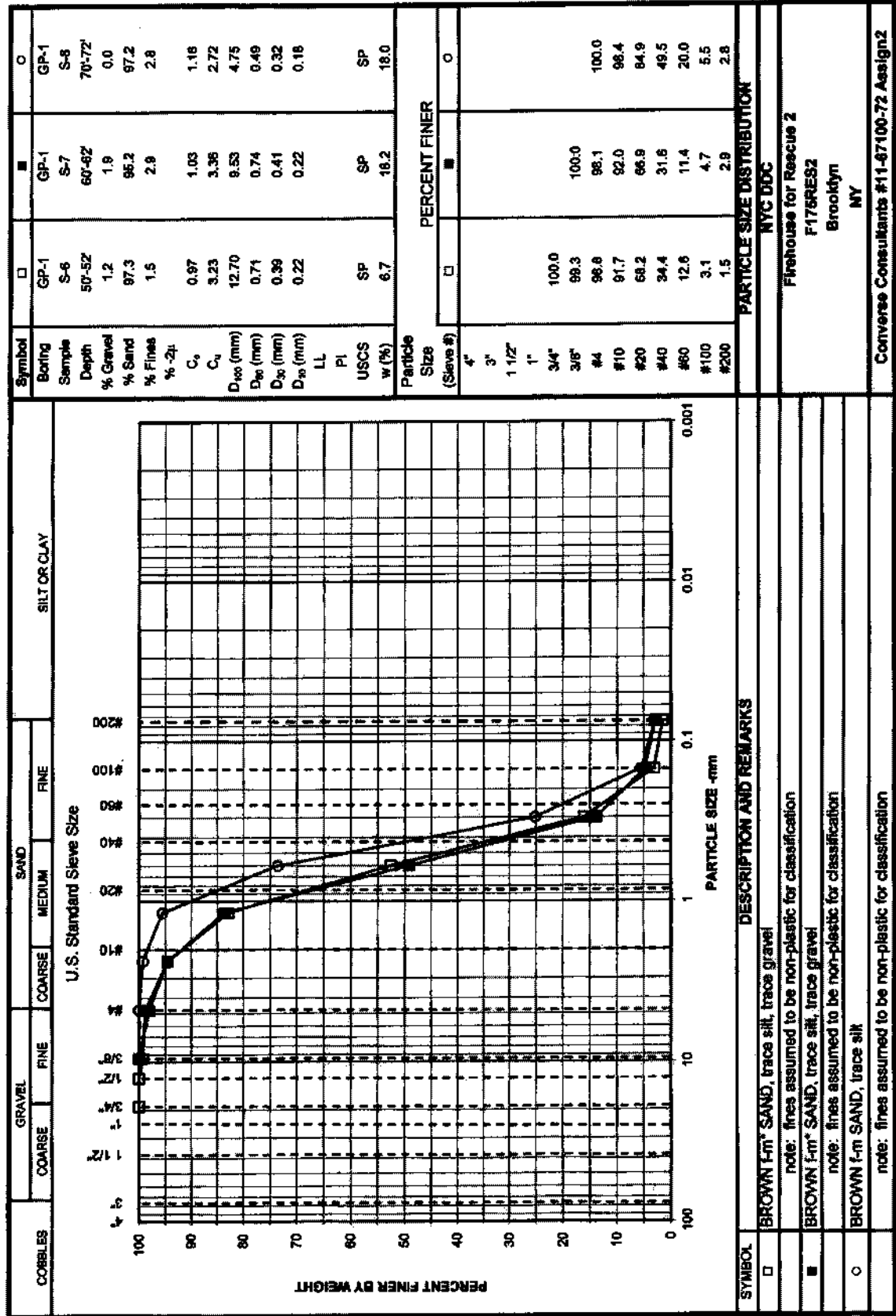
Prepared by Converse Consultants

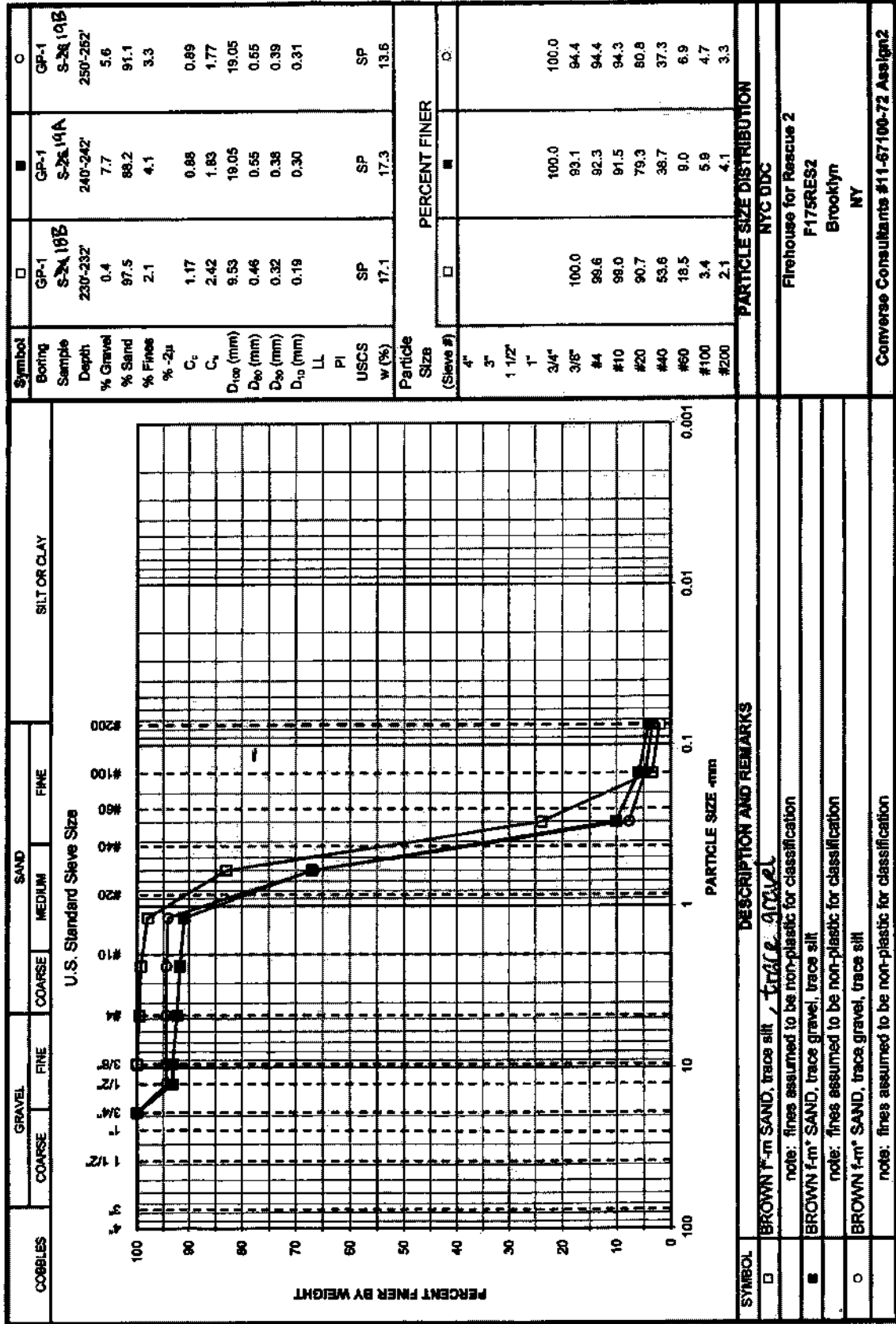


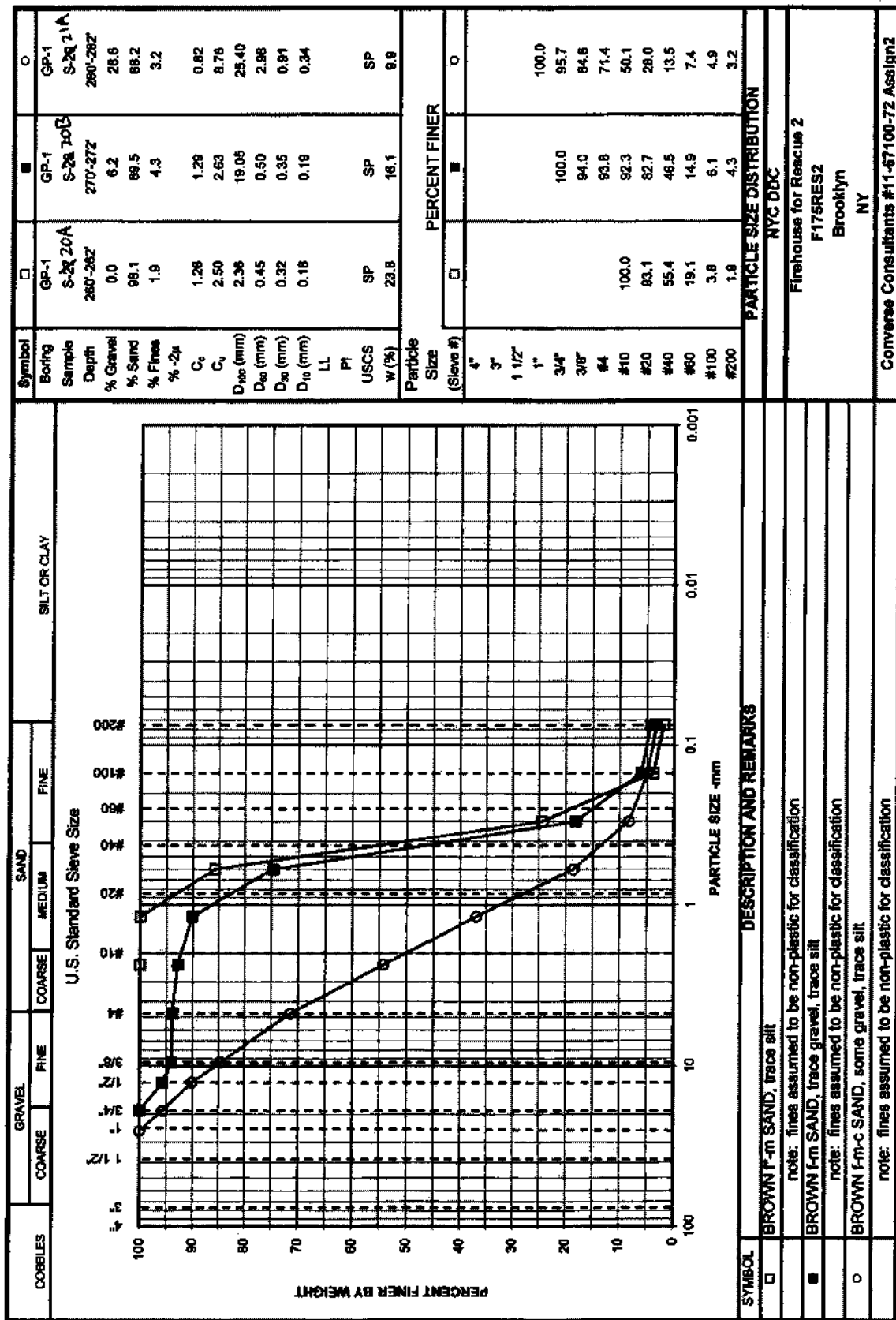
SYMBOL		DESCRIPTION AND REMARKS	
□	GP-1	BROWN F-m SAND, some gravel, some silt	FIREHOUSE FOR REACTOR 2 F176RES2 Brooklyn NY Converse Consultants #11-67100-72 Assign 2
■	GP-1	note: fines assumed to be non-plastic for classification	
■	GP-1	BROWN F-m SAND, some silt, trace gravel	
■	GP-1	note: fines assumed to be non-plastic for classification	
○	GP-1	BROWN F-m SAND, some silt, some gravel	FIREHOUSE FOR REACTOR 2 F176RES2 Brooklyn NY Converse Consultants #11-67100-72 Assign 2
○	GP-1	note: fines assumed to be non-plastic for classification	
○	GP-1	BROWN F-m SAND, some silt, some gravel	
○	GP-1	note: fines assumed to be non-plastic for classification	

NOTE: S-6 THROUGH S-8 RESULTS
IN NEXT PAGE

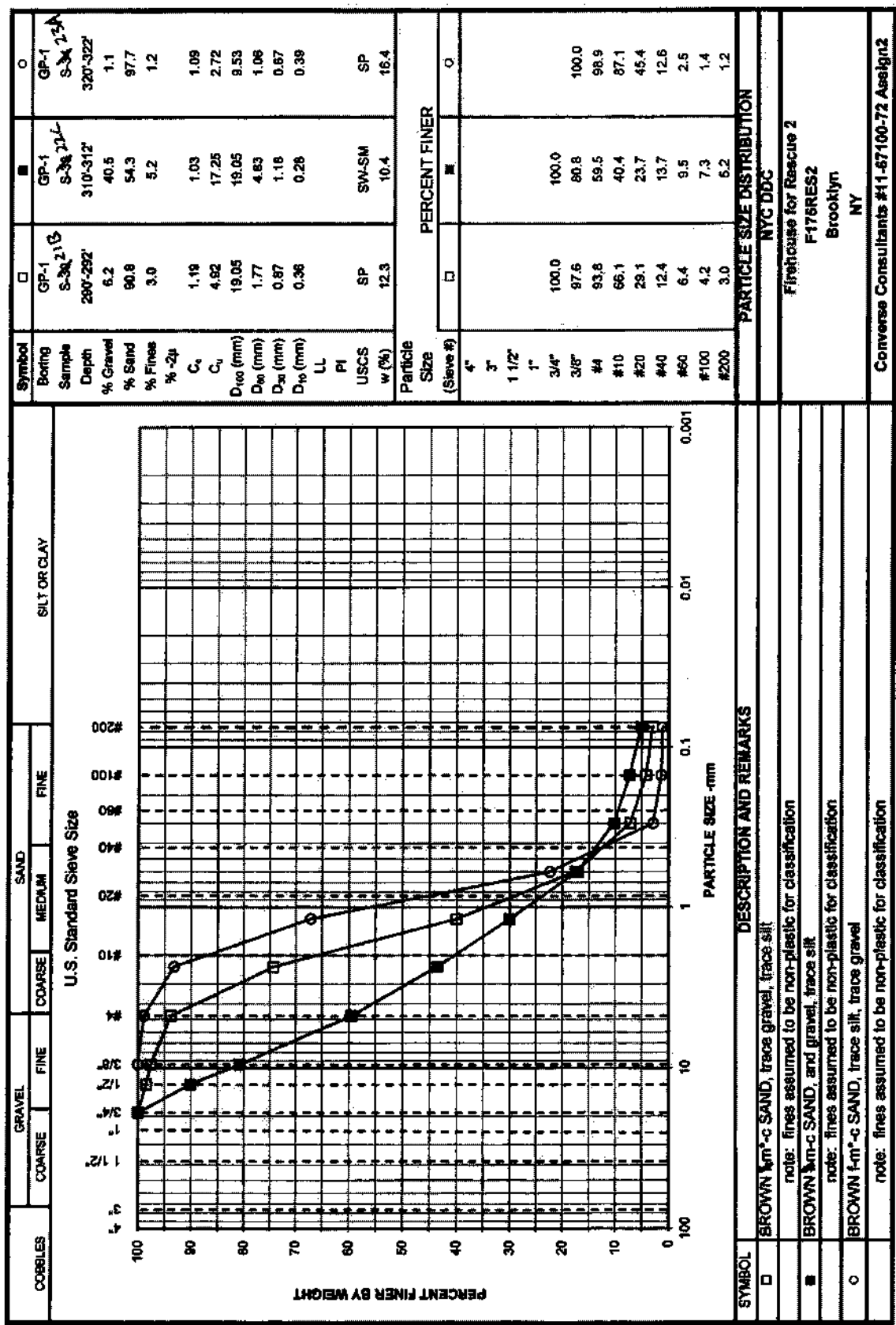




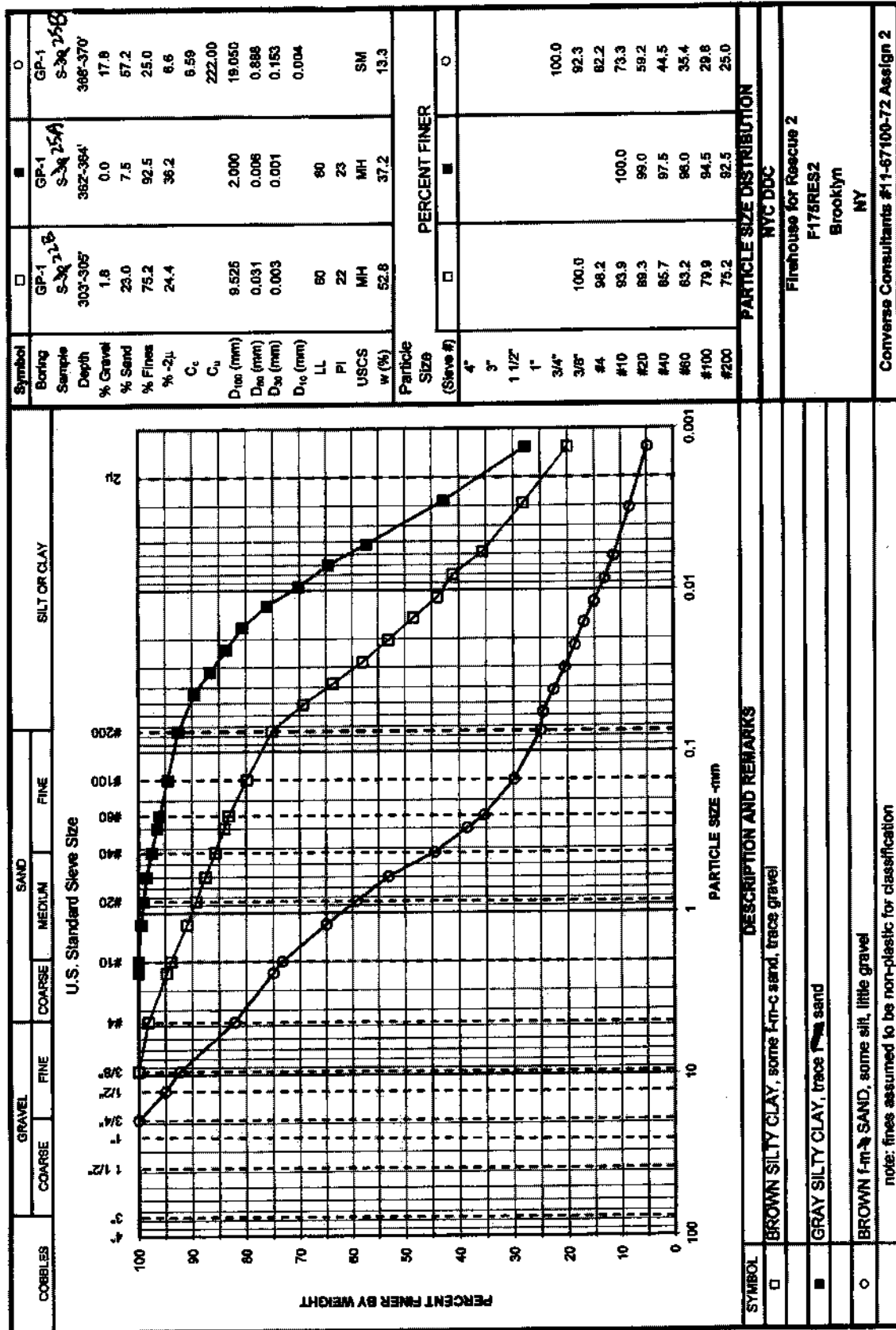




NOTE: S-22A AND S-22B RESULTS
IN FOLLOWING 2 PAGES



NOTE: S-22C AND S-23A RESULTS
IN PREVIOUS 2 PAGES
S-23B THROUGH S-24B RESULTS
IN NEXT PAGE.



PARTICLE SIZE DISTRIBUTION

NYC DDC

Firehouse for Rescue 2

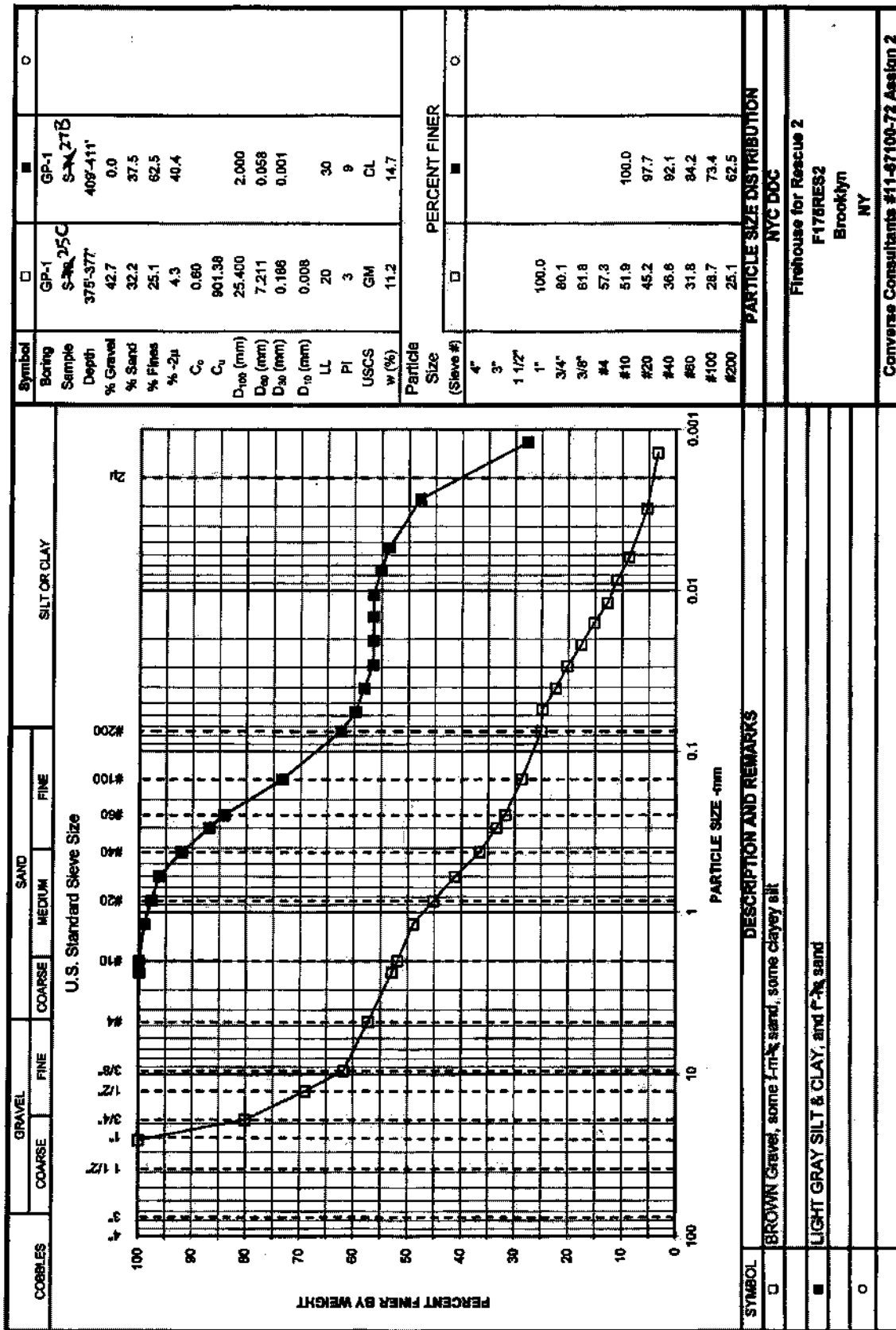
F175RES2

Brooklyn

NY

Converse Consultants #11-67100-72 Assign 2

NOTE: S-26A THROUGH S-27A
RESULTS IN FOLLOWING 2 PAGES



PARTICLE SIZE DISTRIBUTION

NYC DDC

Firehouse for Rescue 2

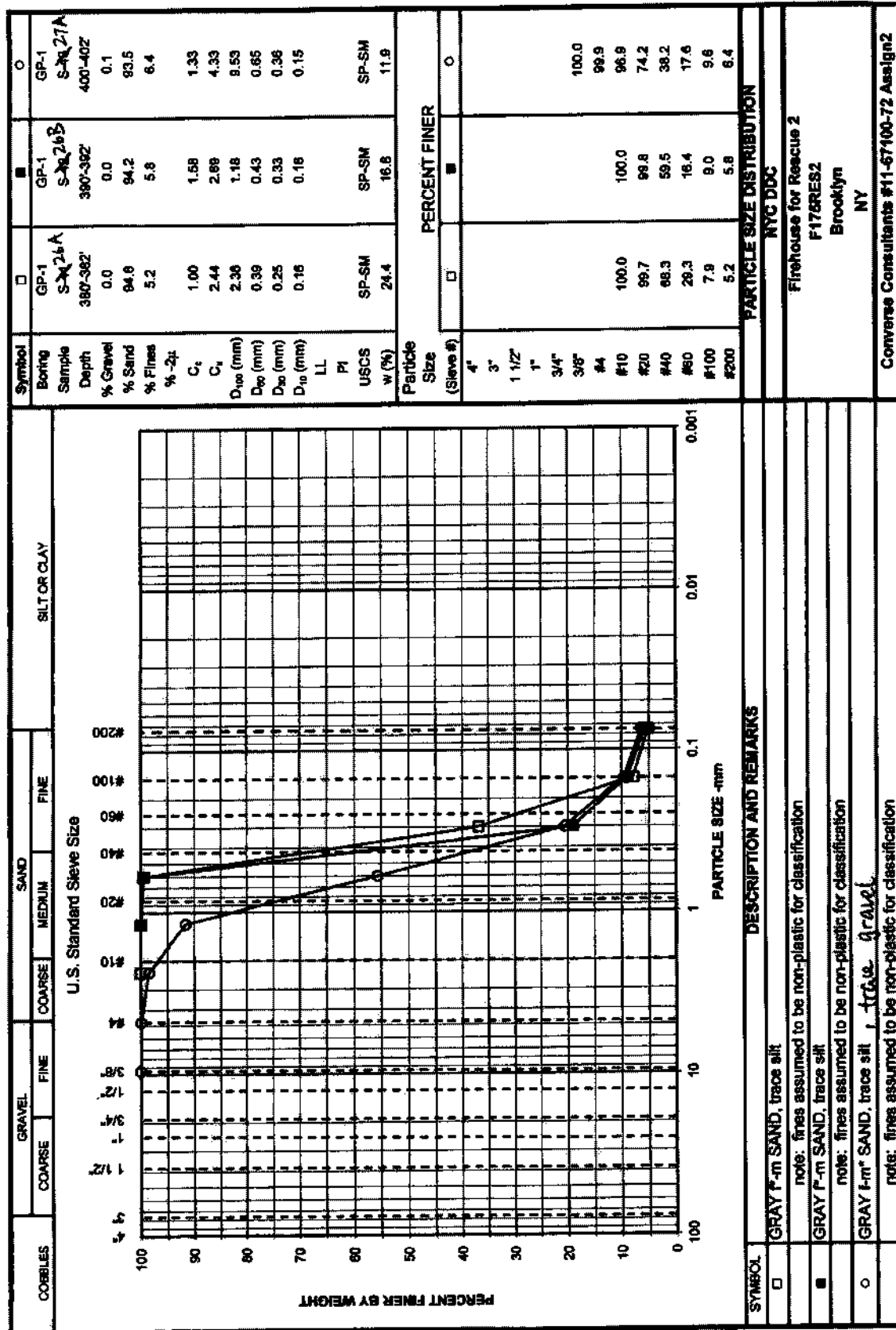
F175RES2

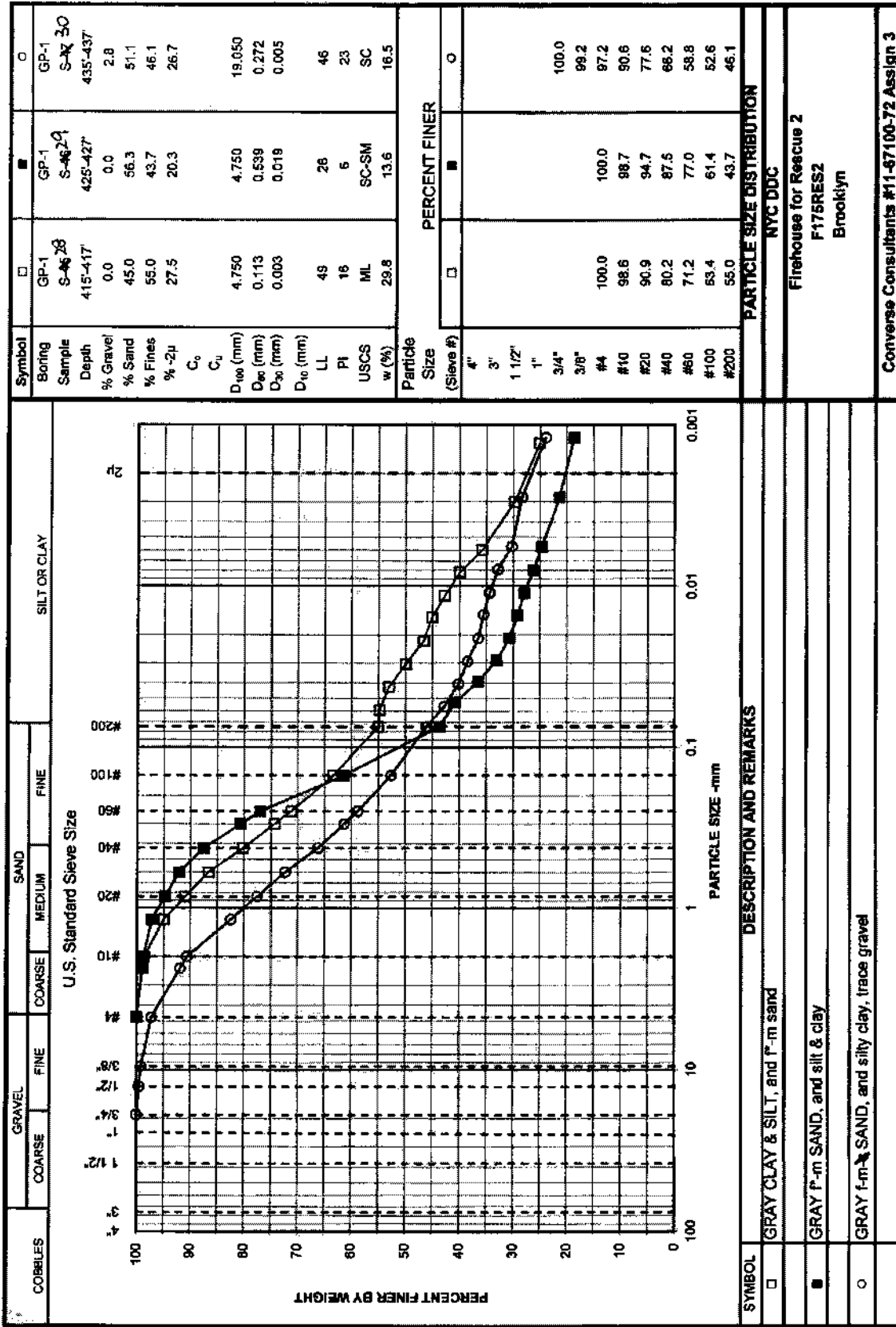
Brooklyn

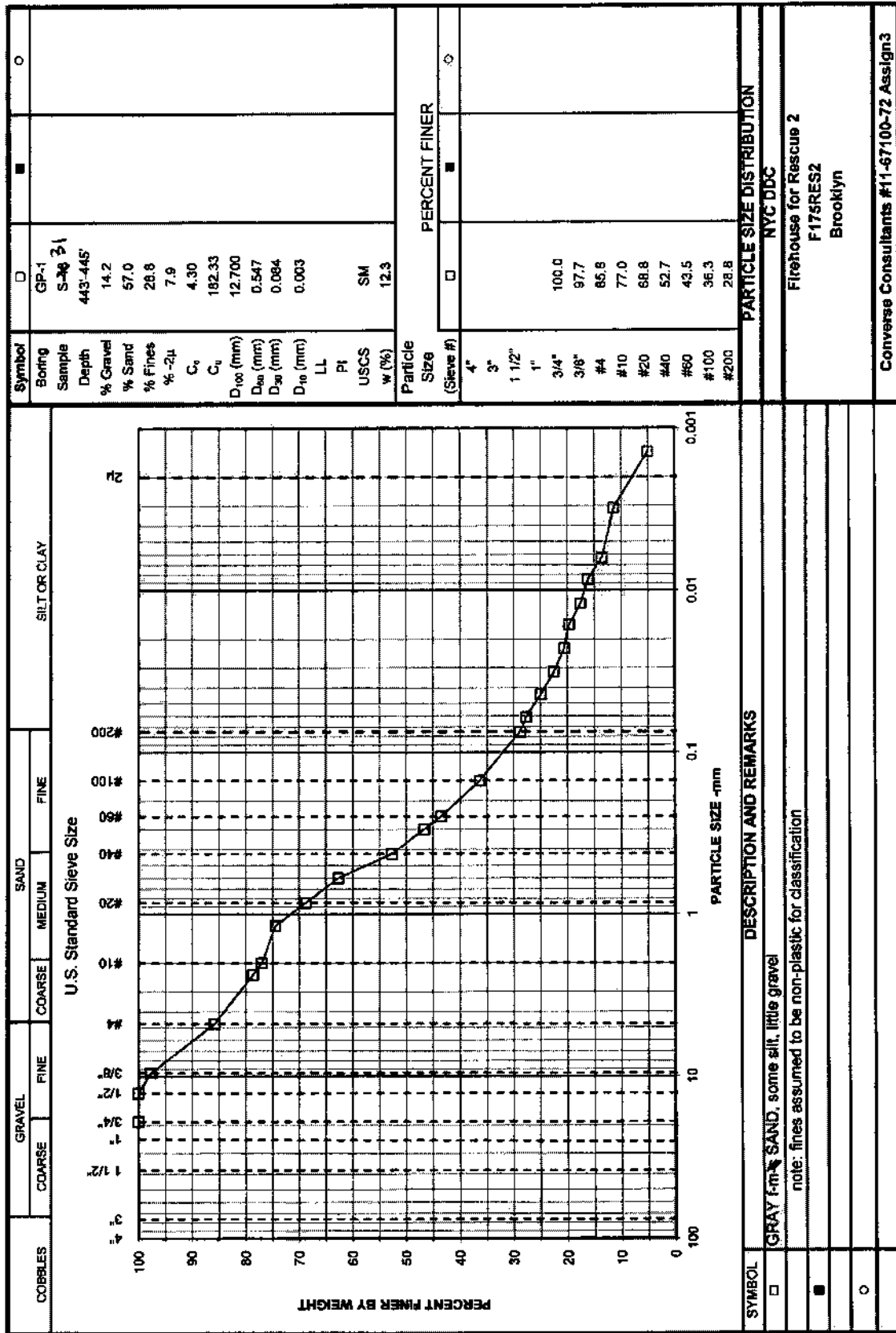
NY

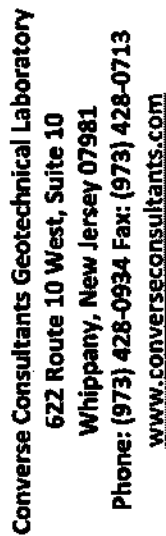
Converse Consultants #11-87100-72 Assign 2

NOTE: 5-278 RESULTS IN PREVIOUS PAGE.



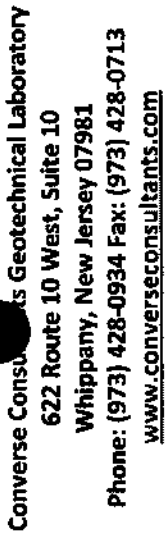






**Yu Assoc. - Parsons Brinkerhoff, JV
11-67100-72 Assignment 2
F175RE52
Firehouse for Rescue 2**

Note: * Sample description and USCS Symbol based on Grain Size and Atterberg Limits Analysis.



**Yu Assoc. – Parsons Brinkerhoff, JV
11-67100-72 Assignment 3
F175RES2
Firehouse for Rescue 2**

[illegible]

Note: * Sample description and USCS Symbol based on Atterberg Limits Analysis.
pg. 1

APPENDIX C

72-Hour Thermal Conductivity Test Results



**FORMATION THERMAL CONDUCTIVITY
TEST & DATA ANALYSIS**

TEST LOCATION **FDNY - Rescue 2
Brooklyn, NY**

TEST DATE **March 24-27, 2015**

ANALYSIS FOR **Aquifer Drilling and Testing, Inc.
430 Hudson River Rd
Waterford , NY 12188
Phone: 518-326-1441
Fax: 518-326-1443**

TEST PERFORMED BY **Aquifer Drilling and Testing, Inc.**

EXECUTIVE SUMMARY

A formation thermal conductivity test was performed at the FDNY - Rescue 2 site at 1815 Sterling Place in Brooklyn, New York. The vertical bore was completed on March 17, 2015 by Aquifer Drilling and Testing, Inc. Geothermal Resource Technologies' (GRTI) test unit was attached to the vertical bore on the morning of March 24, 2015.

This report provides an overview of the test procedures and analysis process, along with plots of the loop temperature and input heat rate data. The collected data was analyzed using the "line source" method and the following average formation thermal conductivity was determined.

Formation Thermal Conductivity = 1.38 Btu/hr-ft-°F

Due to the necessity of a thermal diffusivity value in the design calculation process, an estimate of the average thermal diffusivity was made for the encountered formation.

Formation Thermal Diffusivity $\approx 1.03 \text{ ft}^2/\text{day}$

The undisturbed formation temperature for the tested bore was established from the initial loop temperature data collected at startup.

Undisturbed Formation Temperature $\approx 56.7\text{-}57.5^\circ\text{F}$

The formation thermal properties determined by this test do not directly translate into a loop length requirement (i.e. feet of bore per ton). These parameters, along with many others, are inputs to commercially available loop-field design software to determine the required loop length. Additional questions concerning the use of these results are discussed in the frequently asked question (FAQ) section at www.grti.com.

TEST BORE DETAILS

(AS PROVIDED BY AQUIFER DRILLING AND TESTING, INC.)

Site Name.....	FDNY - Rescue 2
Location.....	Brooklyn, NY
Driller.....	Aquifer Drilling and Testing, Inc.
Installed Date.....	March 17, 2015
Borehole Diameter.....	6 1/2 inches, 0-445 ft 5 inches, 445-499.5 ft
U-Bend Size.....	1 1/4 inch DR-11 HDPE
U-Bend Depth Below Grade.....	499.5 ft
Grout Type.....	GeoPro Thermal Grout Select
Grout Mixture.....	250 lb sand per 50 lb bentonite
Grouted Portion.....	Entire bore

DRILL LOG

FORMATION DESCRIPTION	DEPTH (FT)
Gray-brown m-f sand, little silt	0'-1'
Brown m-f sand, little silt, little f gravel	1'-3'
Boulder	3'-5'
Brown silt, some f sand	5'-7'
Gravel and cobbles, little m-f sand, little silt	7'-9'
Brown f sand, little silt, trace f gravel	9'-15'
Brown f sand, little silt, trace c-f gravel	15'-20'
Brown f sand, little silt, trace f gravel	20'-27'
Few cobbles	27'-29'
Brown f sand, little silt, trace f gravel	29'-50'
Brown m-f sand, trace silt	50'-90'
Brown m-f sand	90'-100'
Gray brown m-f sand	100'-140'
Brown m-f sand	140'-150'
Brown f sand, trace silt	150'-180'
Brown m-f sand, trace silt	180'-190'
Brown c-f sand, little f gravel	190'-200'
Brown m-f sand, trace silt	200'-220'
Brown m-f sand, trace silt, trace f gravel	220'-230'
Brown m-f sand, trace silt	230'-240'
Brown m-f sand, trace f gravel	240'-260'
Brown m-f sand, trace silt	260'-264'
Brown m-f sand, trace silt, some c-f gravel	264'-264.5'

DRILL LOG CONTINUED

FORMATION DESCRIPTION	DEPTH (FT)
Brown m-f sand, trace silt, trace f gravel	264.5'-273.5'
Brown f sand, some silt	273.5'-274'
Brown c-f sand, little f gravel	274'-283'
Brown c-f sand, little f gravel, few cobbles	283'-286'
Brown c-f sand, trace f gravel	286'-299.5'
Gray clay and silt	299.5'-303'
Brown silt and clay, trace f sand	303'-306'
Brown c-f sand, trace f gravel, trace silt	306'-320'
Dark brown m-f sand, trace silt	320'-330'
Dark gray c-f sand, trace silt, trace f gravel, few cobbles	330'-338'
Gray f gravel, some dark gray c-m sand, trace silt	338'-350'
Gray f gravel, some dark gray c-m sand, trace silt, occasional coarse gravel, few cobbles	350'-362'
Dark gray clay and silt	362'-368'
Brown m-f sand, little clayey silt, trace f gravel	368'-372'
Brown and gray c-f gravel, little c-f sand, trace silt	372'-375'
Gray brown silt and clay, little f gravel, trace m-f sand	375'-379'
Gray m-f sand, trace silt	379'-406'
Orange brown m-f sand, little clayey silt	406'-407'
Light gray-brown clay and silt, very hard	407'-412'
Gray green silt and clay, hard	412'-422'
Gray clayey silt, little f sand, micaceous (residual soil - decomposed rock)	422'-440'
Gray m-f sand, little silt, little f gravel (residual soil - decomposed rock)	440'-450'
Dark gray quartz mica schist	450'-490'
Gray gneiss	490'-499.5'

THERMAL CONDUCTIVITY TEST DATA

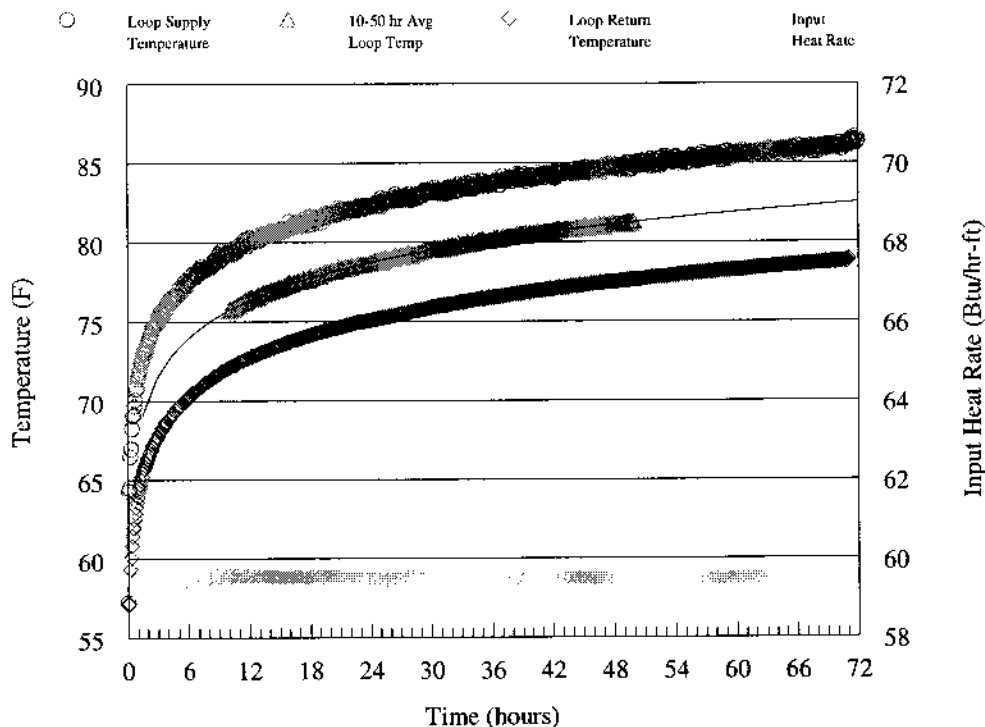


FIG. 1: TEMPERATURE & HEAT RATE DATA VS TIME

Figure 1 above shows the loop temperature and heat input rate data versus the elapsed time of the test. The temperature of the fluid supplied to and returning from the U-bend are plotted on the left axis, while the amount of heat supplied to the fluid is plotted on the right axis on a per foot of bore basis. In the test statistics below, calculations on the power data were performed over the analysis time period listed in the Line Source Data Analysis section.

SUMMARY TEST STATISTICS

Test Date	March 24-27, 2015
Undisturbed Formation Temperature	Approx. 56.7-57.5°F
Duration	72.0 hr
Average Voltage	249.7 V
Average Heat Input Rate	29,729 Btu/hr (8,711 W)
Avg Heat Input Rate per Foot of Bore	59.5 Btu/hr-ft (17.4 W/ft)
Calculated Circulator Flow Rate	8.2 gpm
Standard Deviation of Power	0.06%
Maximum Variation in Power	0.16%

LINE SOURCE DATA ANALYSIS

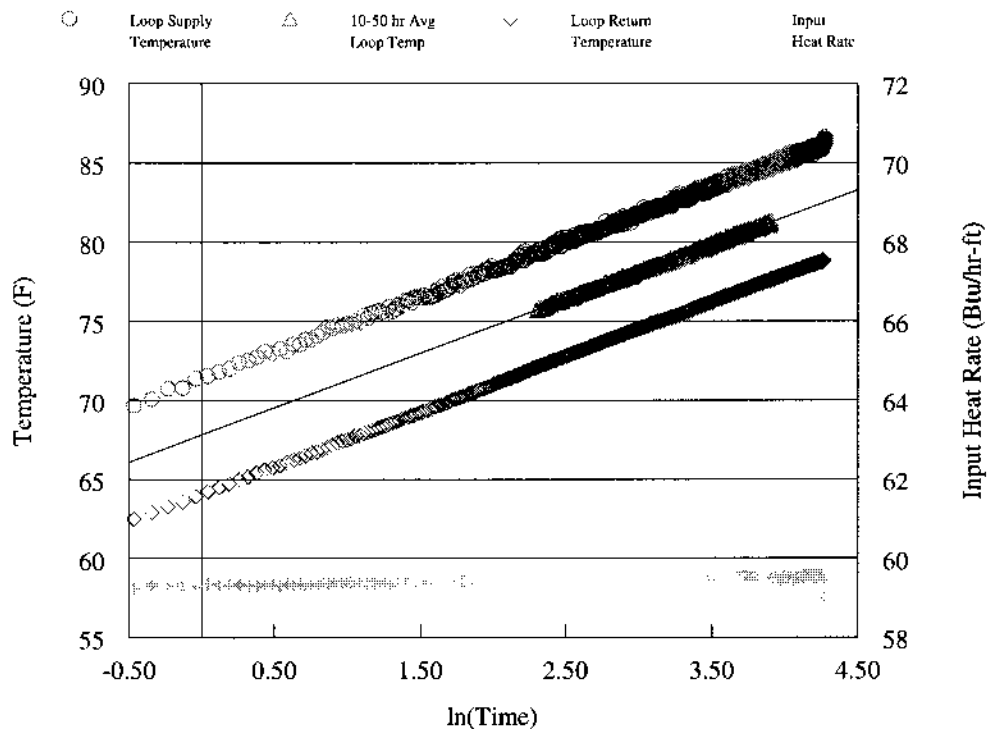


FIG. 2: TEMPERATURE & HEAT RATE VS NATURAL LOG OF TIME

The loop temperature and input heat rate data versus the natural log of elapsed time are shown above in Figure 2. The temperature versus time data was analyzed using the line source method (see page 3) in conformity with ASHRAE and IGSHA guidelines. A linear curve fit was applied to the average of the supply and return loop temperature data between 10 and 50.0 hours. The slope of the curve fit was found to be 3.44. The resulting thermal conductivity was found to be 1.38 Btu/hr-ft-°F.

THERMAL DIFFUSIVITY

The reported drilling log for this test borehole indicated that the formation consisted of clay, silt, sand, gravel, schist and gneiss. Heat capacity values for schist and gneiss were calculated from specific heat and density values listed by Kavanaugh and Rafferty (Ground-Source Heat Pumps - Design of Geothermal Systems for Commercial and Institutional Buildings, ASHRAE, 1997). A weighted average of heat capacity values based on the indicated formation was used to determine an average heat capacity of 32.2 Btu/ft³-°F for the formation. A diffusivity value was then found using the calculated formation thermal conductivity and the estimated heat capacity. The thermal diffusivity for this formation was estimated to be 1.03 ft²/day.



GEOTHERMAL RESOURCE TECHNOLOGIES, INC.

WWW.GRTI.COM

CERTIFICATE OF CALIBRATION

GRTI maintains calibration of the datalogger, current transducer and voltage transducer on a biannual schedule per the manufacturers recommendations. The components are calibrated by the manufacturer using recognized national or international measurement standards such as those maintained by the National Institute of Standards and Technology (NIST).

FTC Unit 233

DA Unit 14

PRIMARY EQUIPMENT		
COMPONENT	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Datalogger	10/29/2013	10/29/2015
Current Transducer	10/30/2013	10/30/2015
Voltage Transducer	10/30/2013	10/30/2015

GRTI periodically verifies the combined temperature sensor/datalogger accuracy via a water bath. Temperature readings are simultaneously taken with a digital thermometer that has been calibrated using instruments traceable to NIST.

	11/7/2013	12/23/2013	1/13/2015	
	31.8 31.8 31.8	53.4 53.5 53.6	47.2 47.3 47.4	
	31.8 31.8 31.8	53.4 53.5 53.6	47.2 47.2 47.2	
	31.8 31.8 31.8	53.5 53.6 53.7	47.2 47.2 47.3	
	31.8 31.8 31.8	53.5 53.5 53.7	47.2 47.3 47.4	
	32.0 32.0 32.0	53.6 53.7 53.8	47.3 47.2 47.2	

WESTERN OFFICE
PO Box 256, Elkton, SD 57026
P: 888-991-4784 F: 605-542-3941

MAIN OFFICE
PO Box 150, Bowie, TX 76230
P: 940-872-2222 F: 940-872-3670

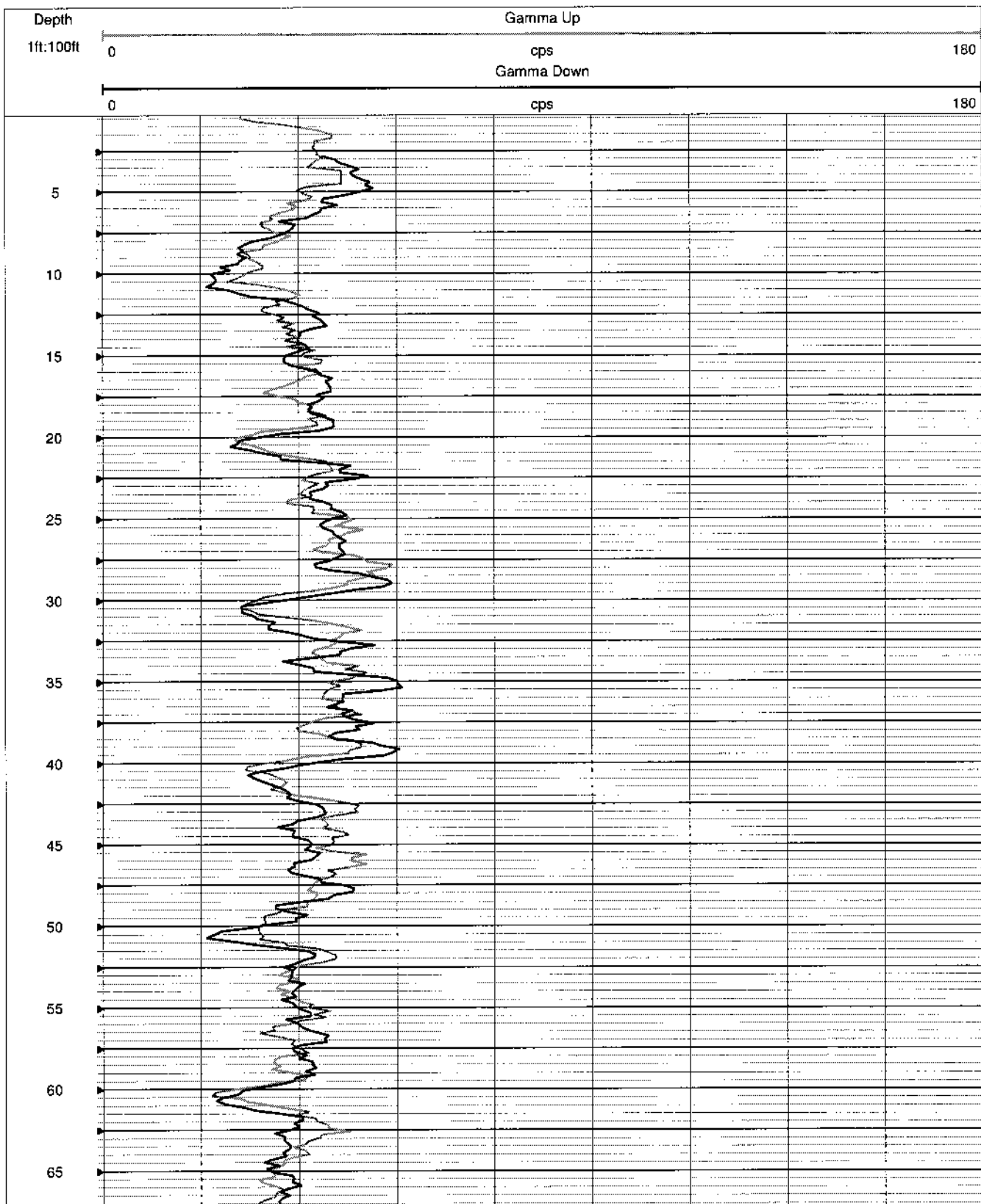
EASTERN OFFICE
PO Box 16143, Asheville, NC 28816
P: 828-225-9168 F: 828-281-4139

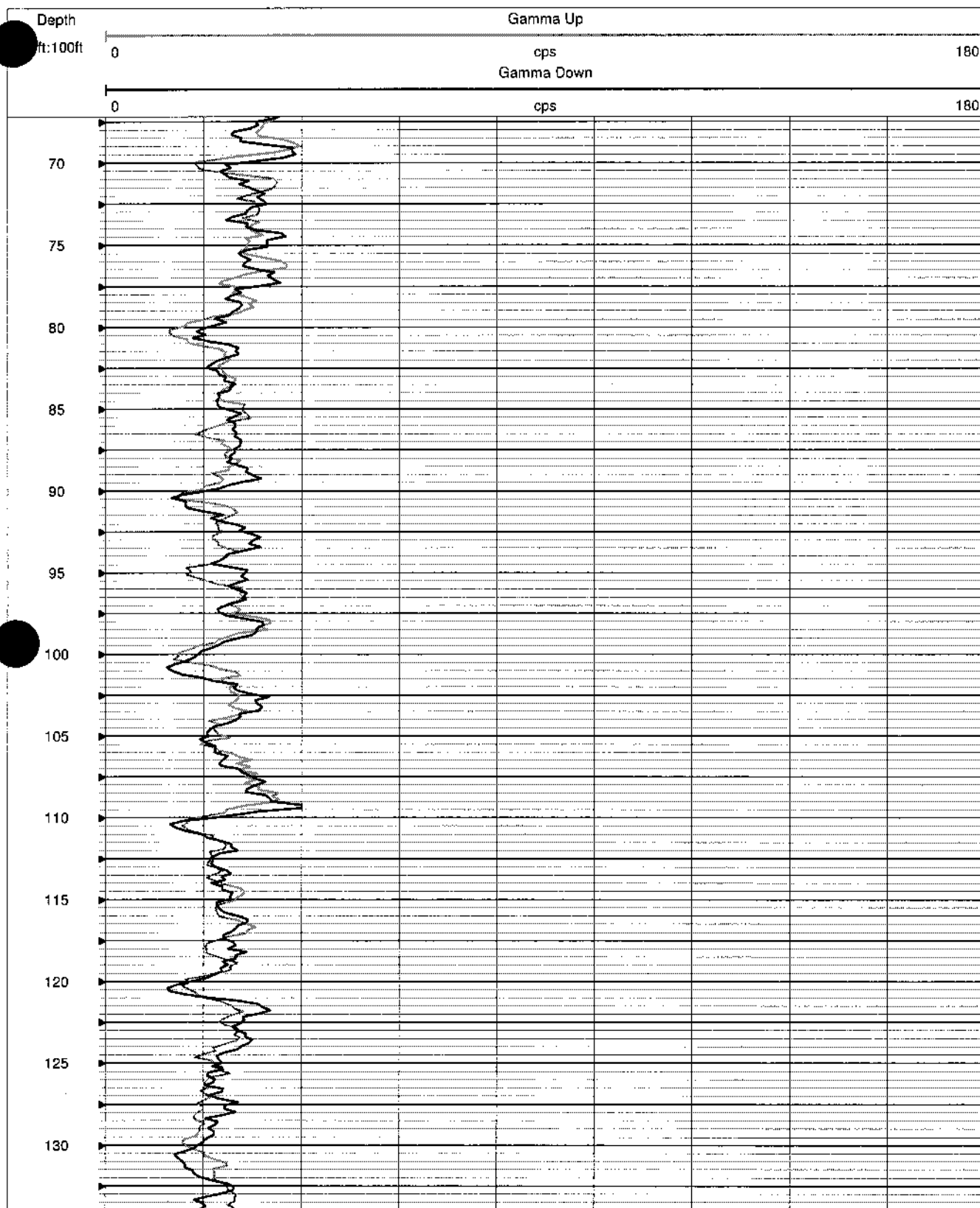
APPENDIX D

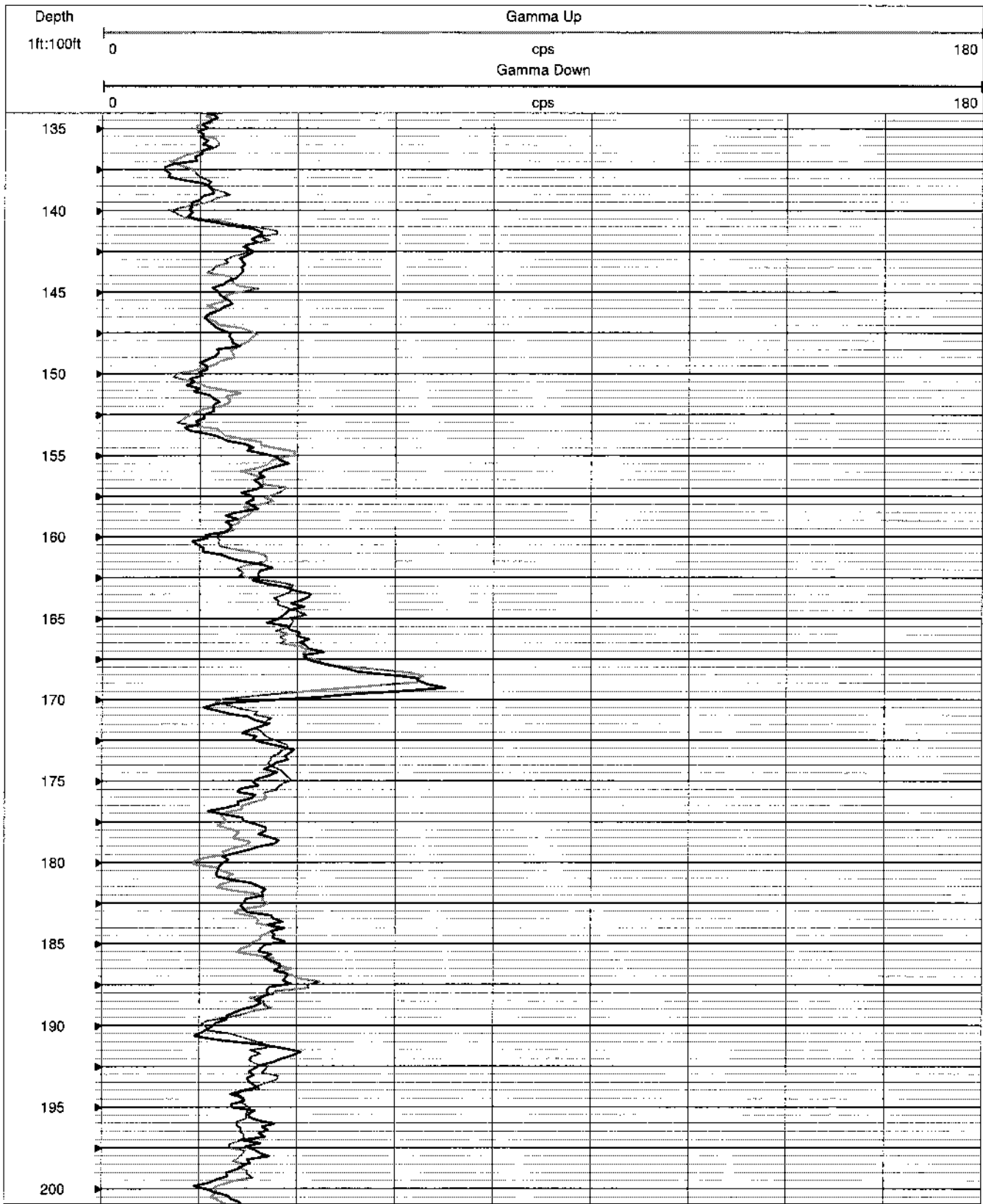
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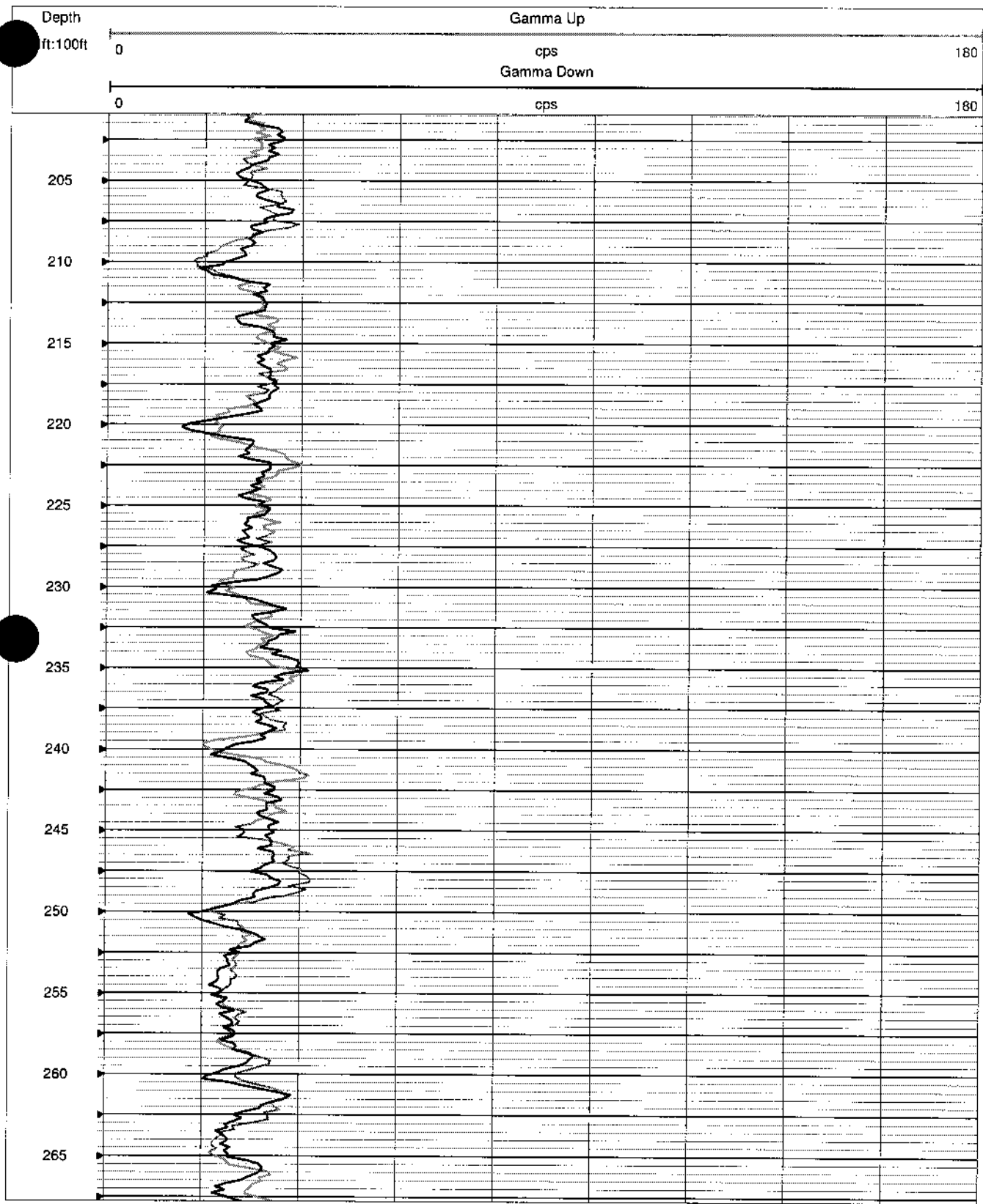
AQUA TERRA GEOPHYSICS INC.

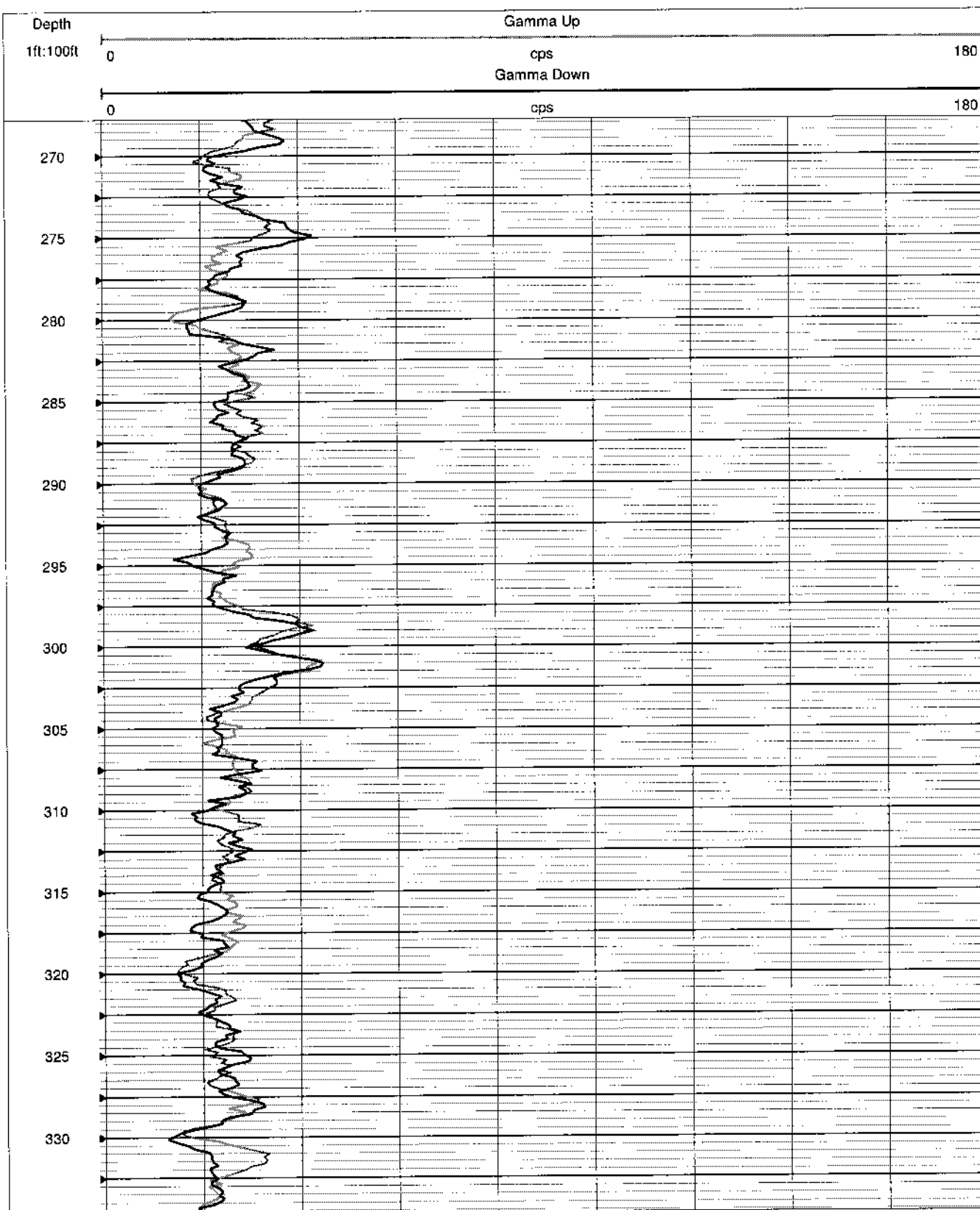
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WELL ID		GP DP-1					
PROJECT		NYC FIRE DEPT.					
TOWN		BROOKLYN				STATE NEW YORK	
LOCATION						OTHER SERVICES	
SEC		TWP		RGE			
PERMANENT DATUM				ELEVATION		K.B.	
LOG MEAS. FROM		GROUND SURFACE		ABOVE PERM. DATUM		D.F.	
DRILLING MEAS. FROM						G.L.	
DATE		MARCH 4, 2015		TYPE FLUID IN HOLE			
LOGGING SPEED		20 FT / MIN		SALINITY			
TYPE LOG		NATURAL GAMMA		DENSITY			
DEPTH-DRILLER		500 FEET		LEVEL			
DEPTH-LOGGER		485 FEET		MAX. REC. TEMP.			
BTM LOGGED INTERVAL							
TOP LOGGED INTERVAL							
OPERATING RIG TIME		2 HRS					
RECORDED BY		BENJAMIN RICE					
WITNESSED BY		M. AKBAR					
RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
				4 INCH	STEEL	0 FEET	440 FEET

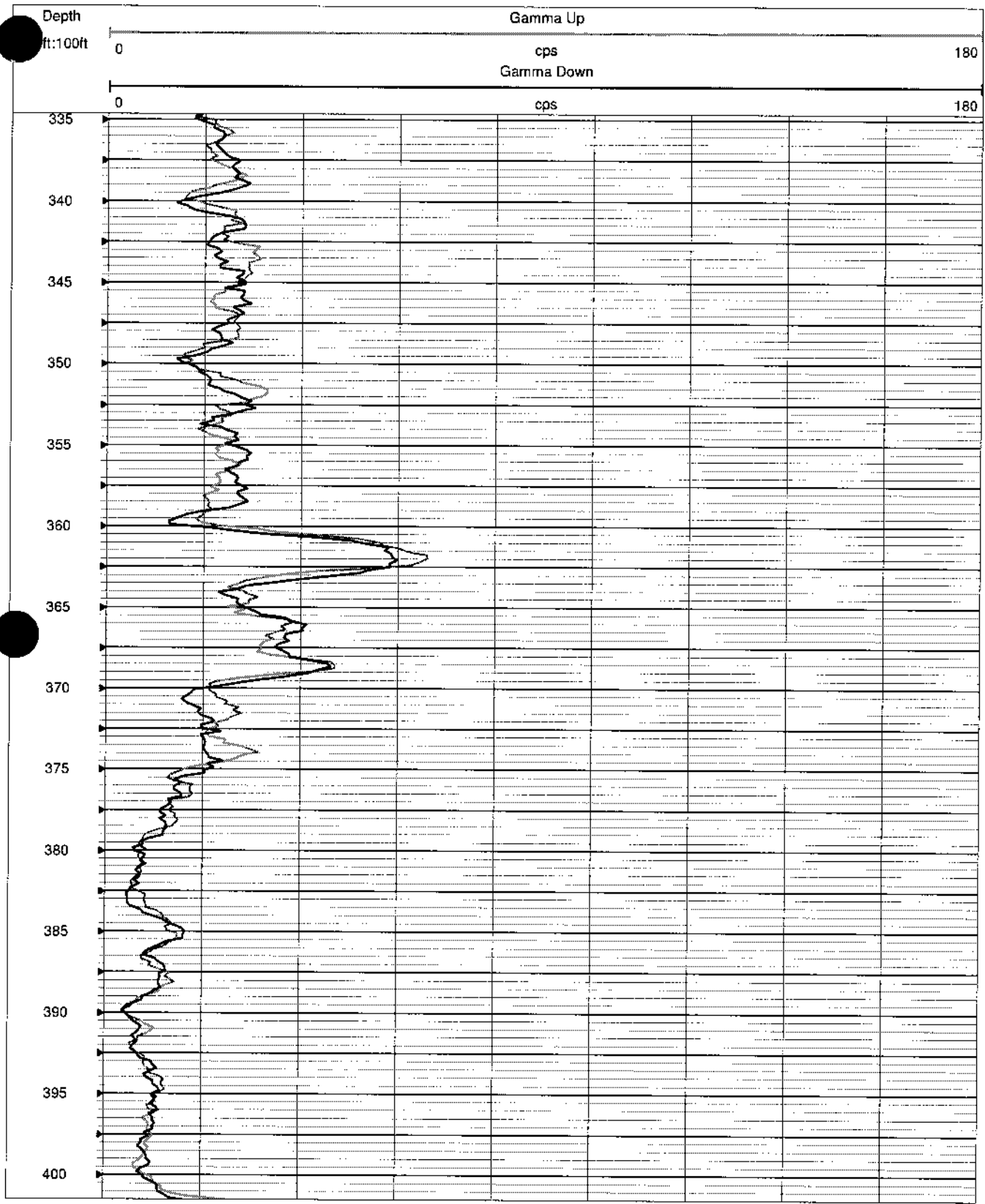


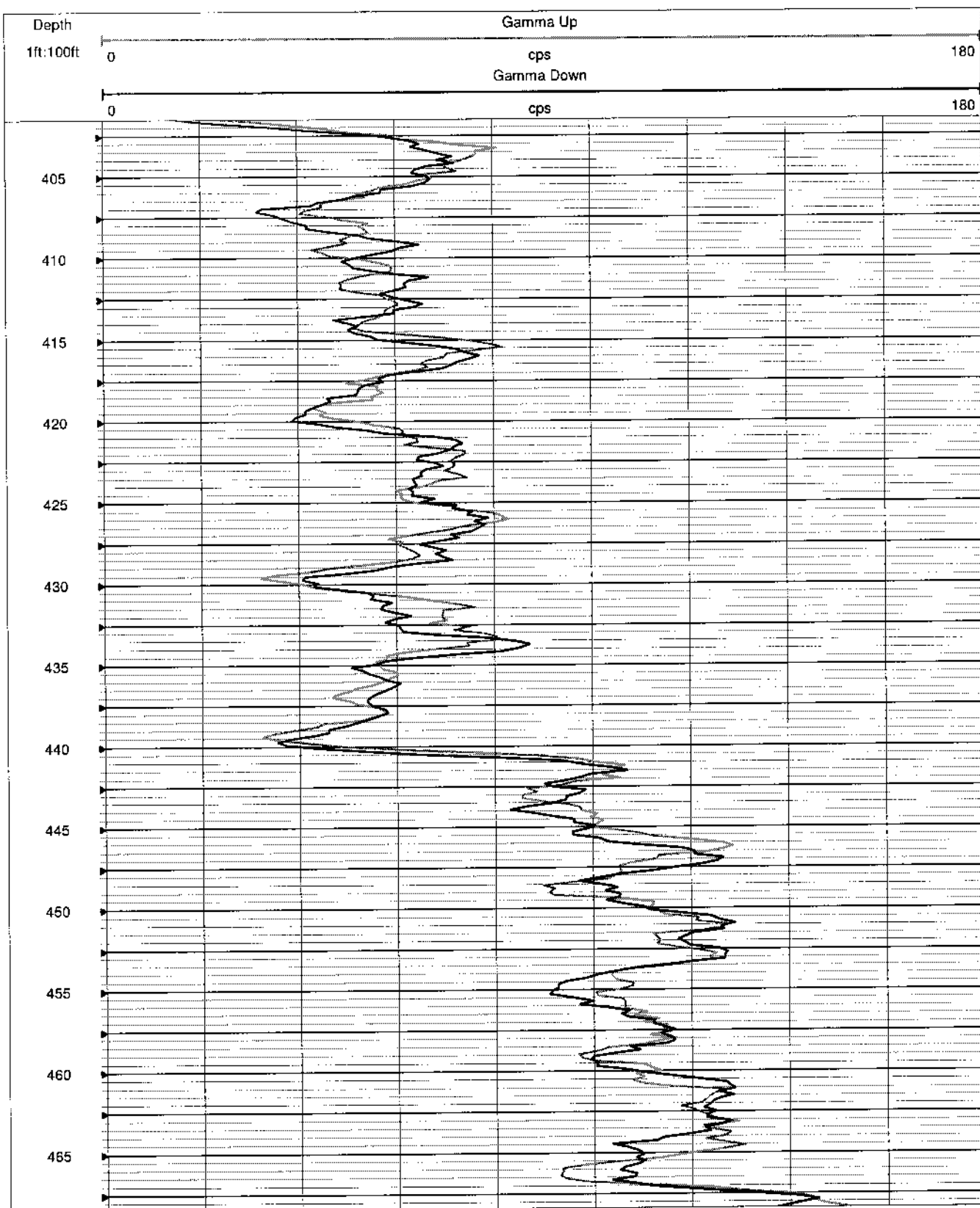


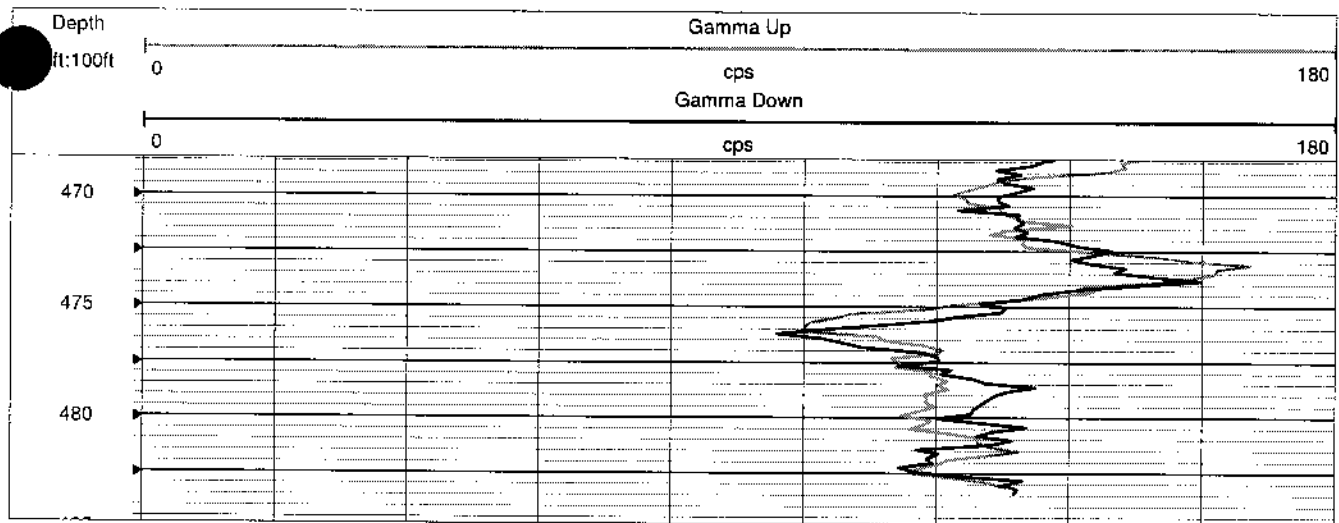




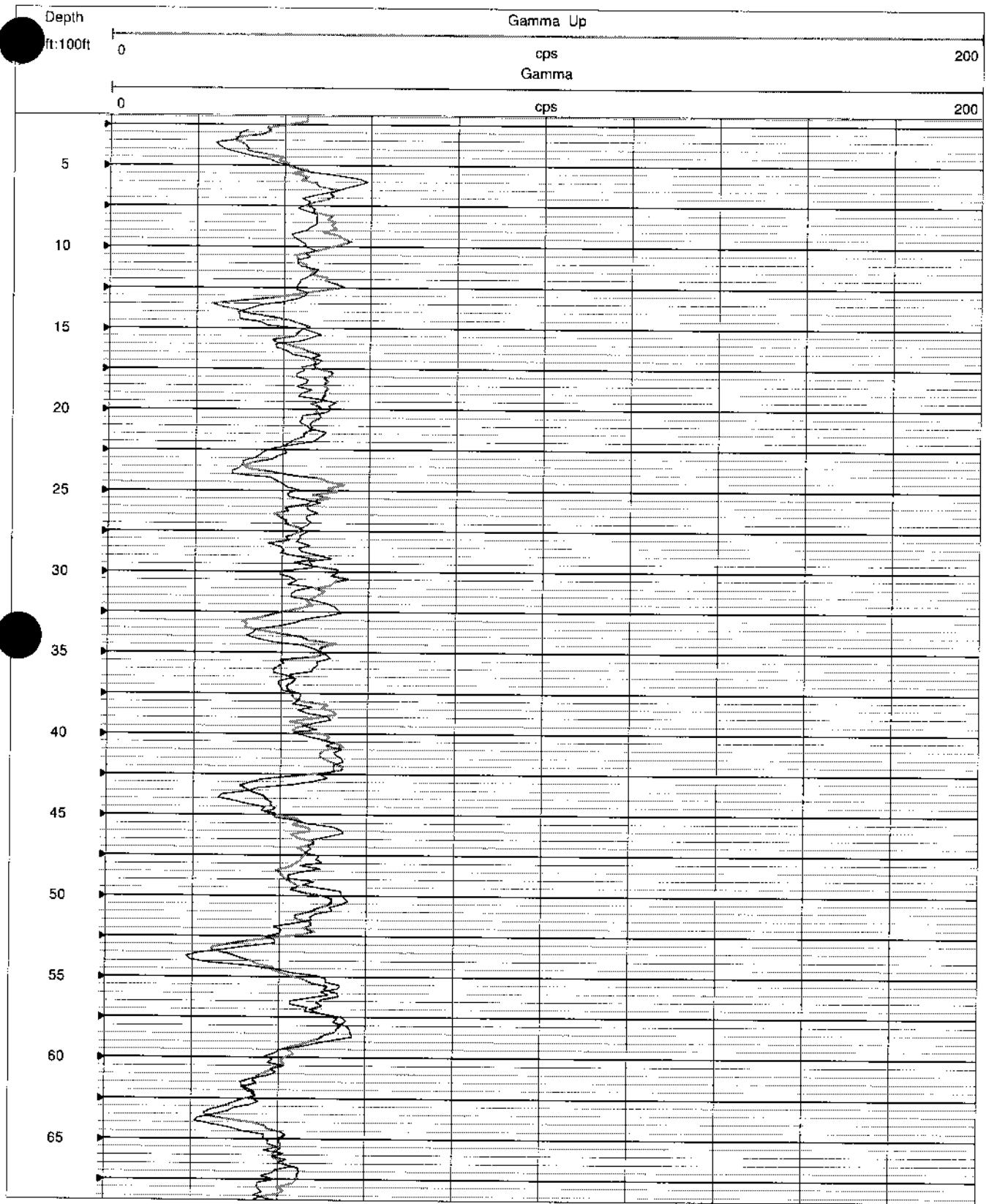


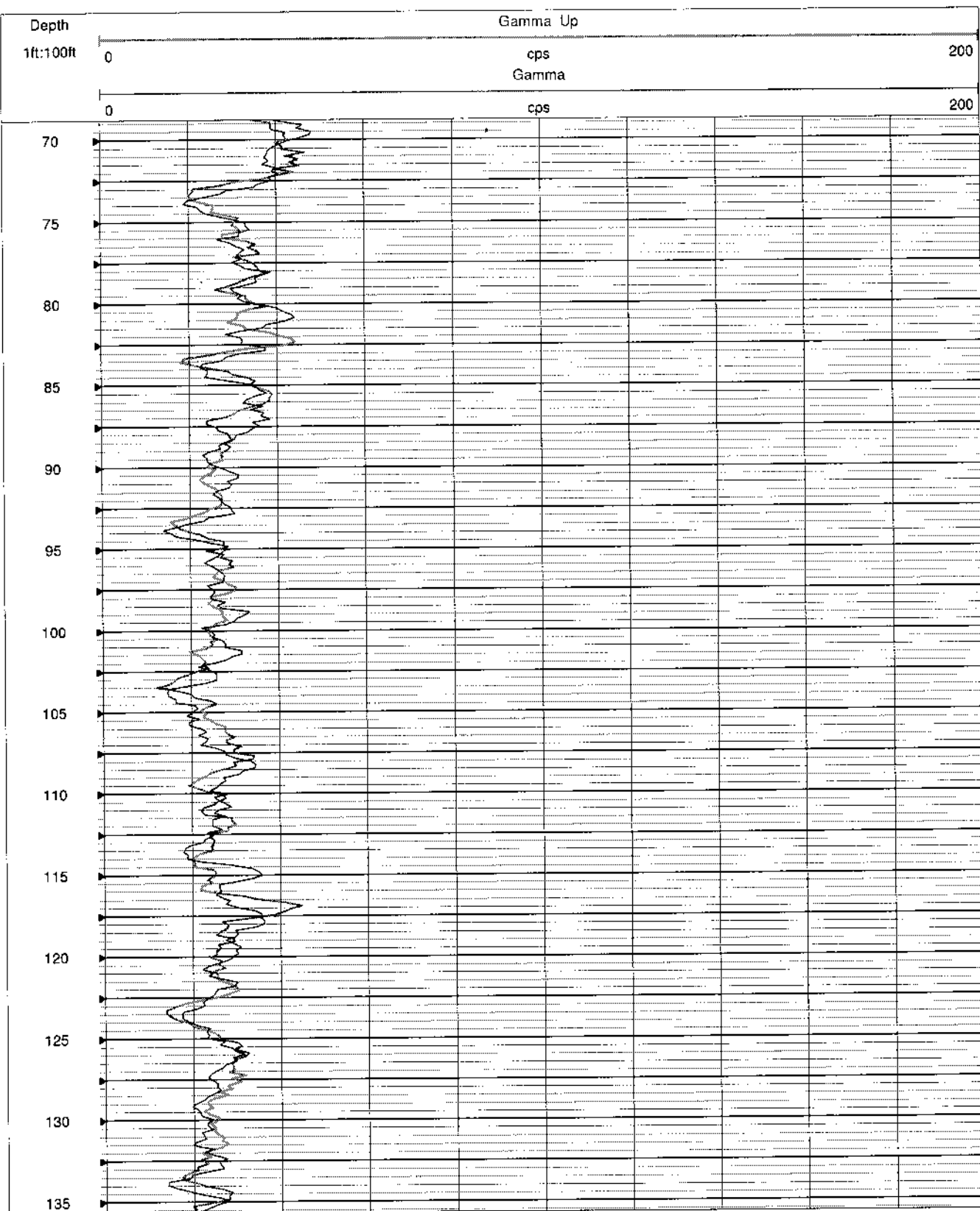


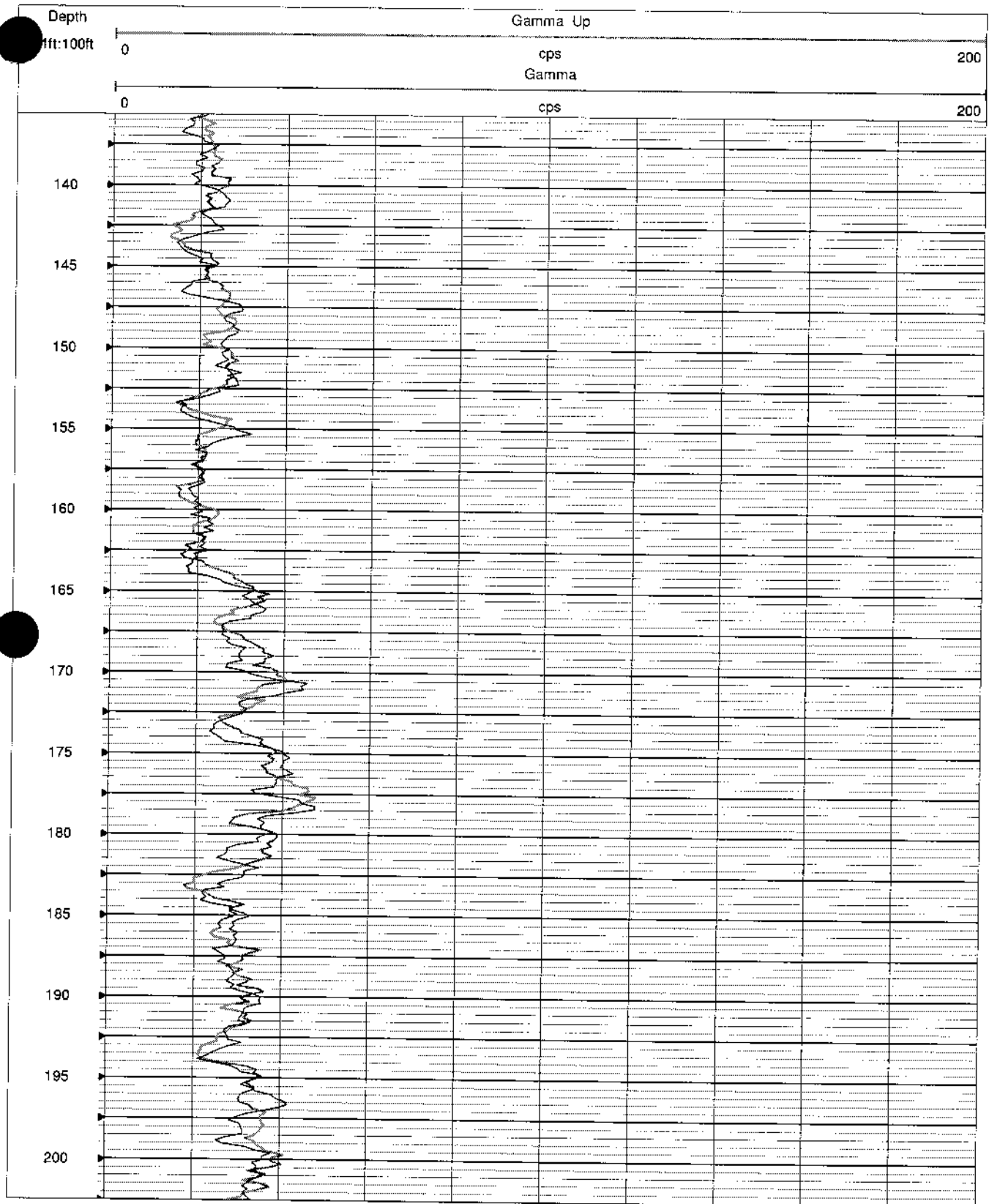


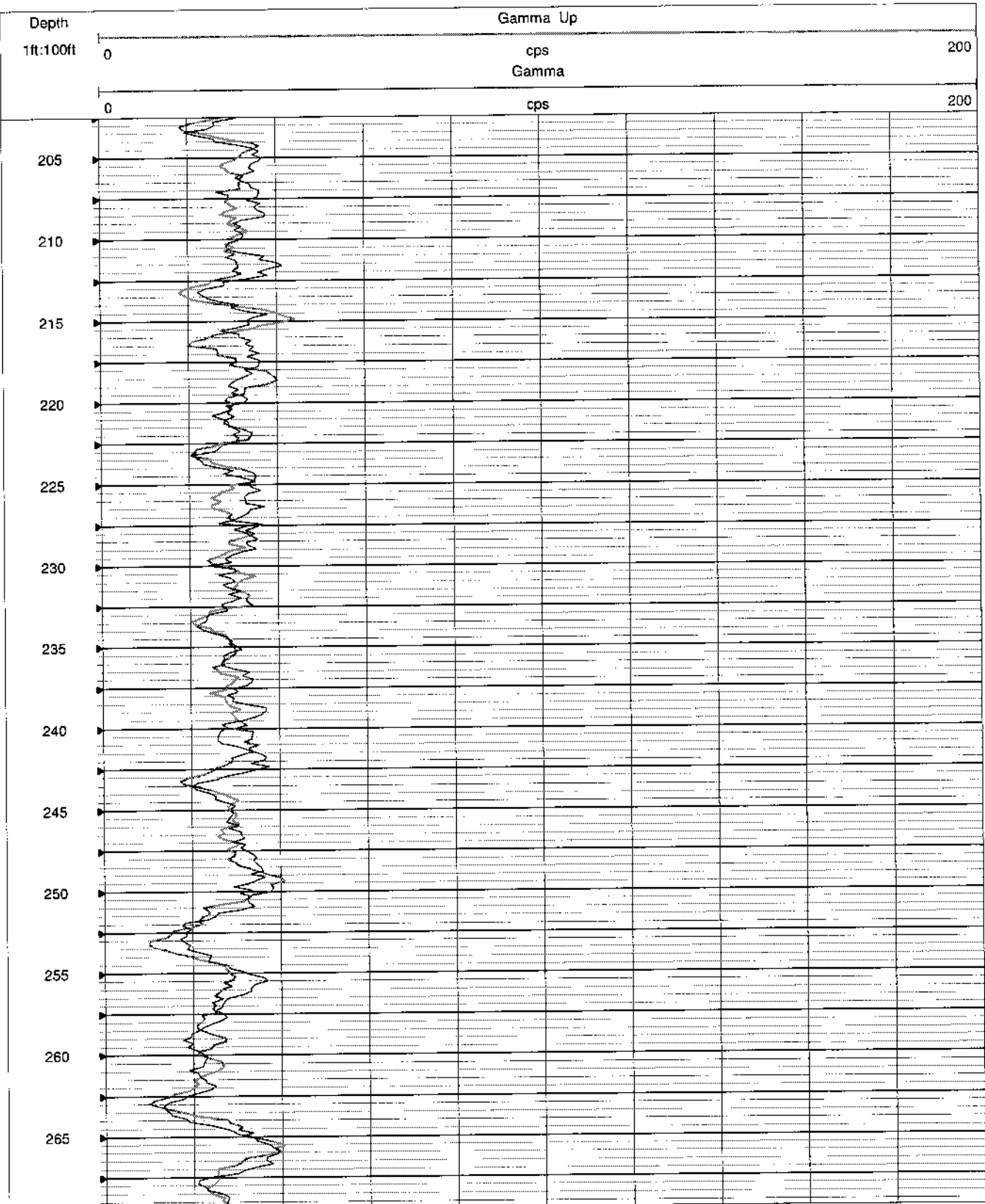


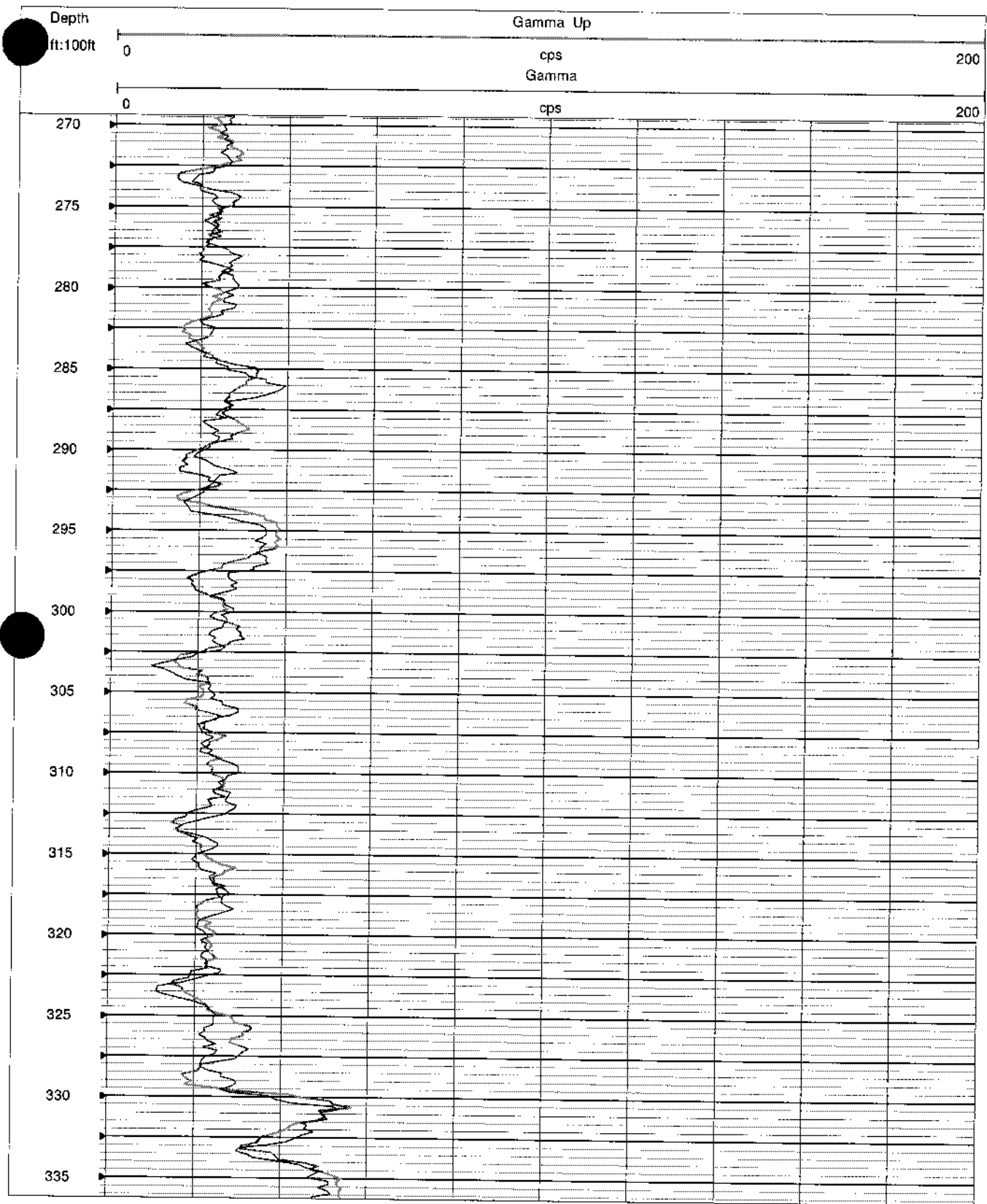
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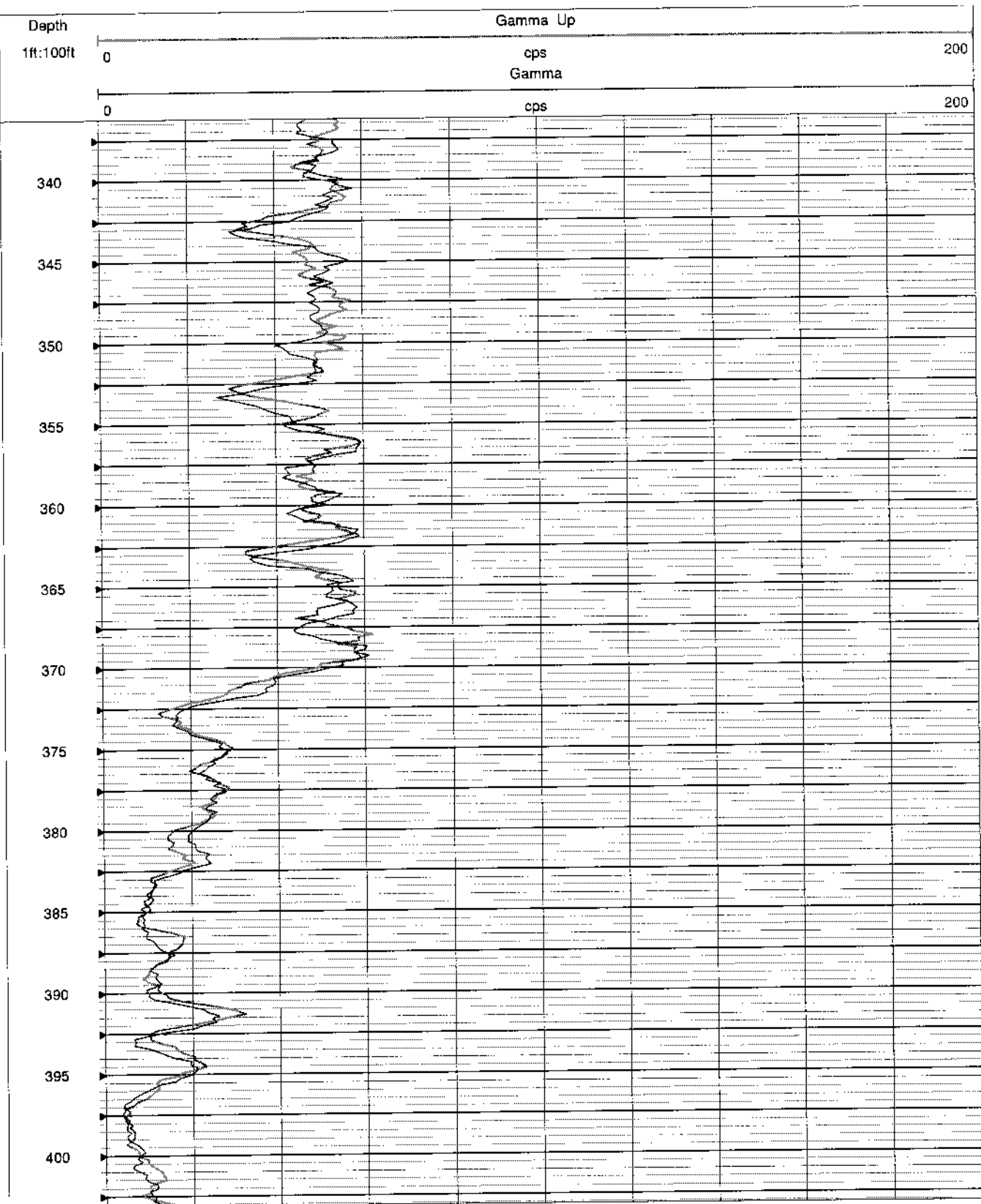


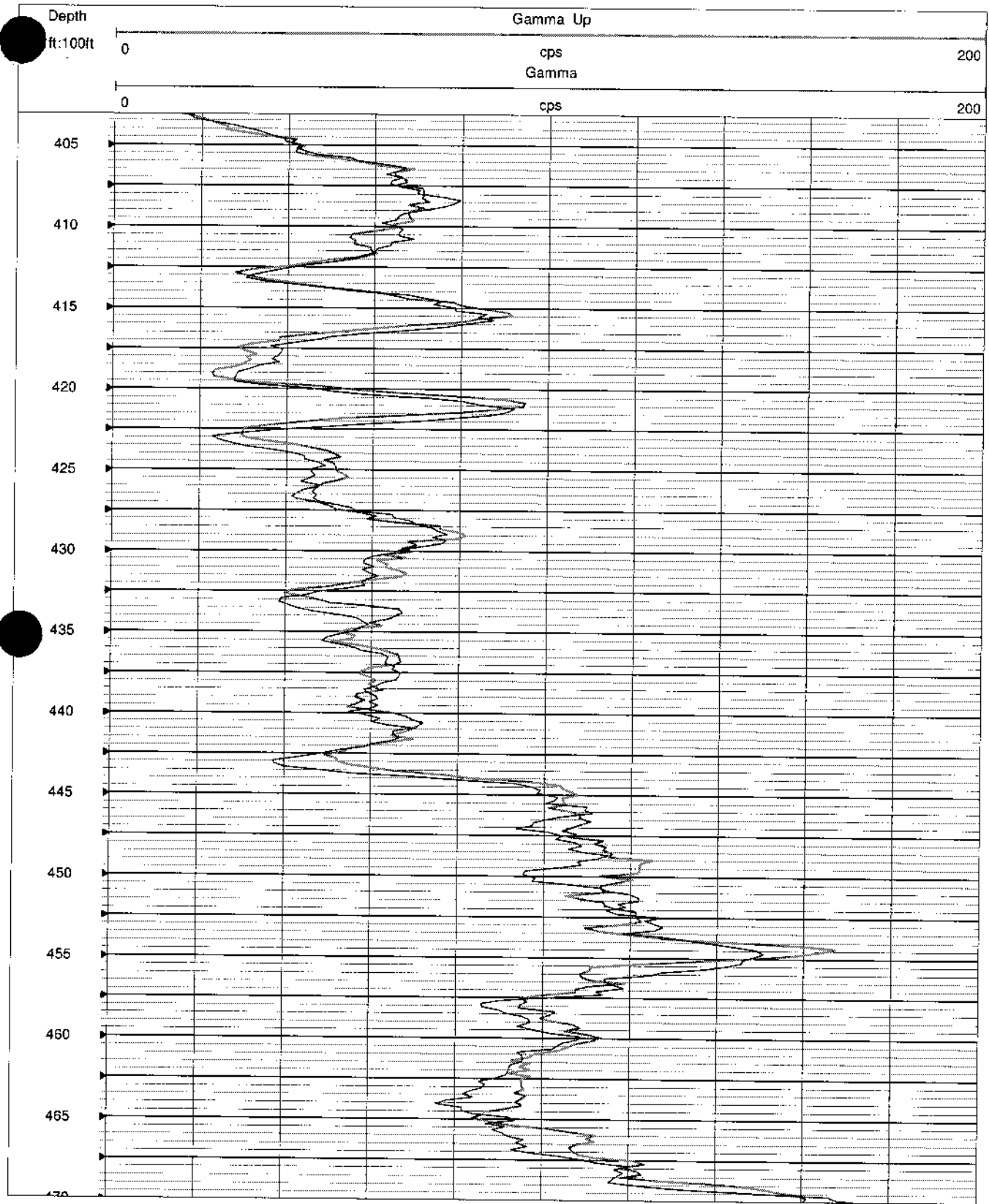


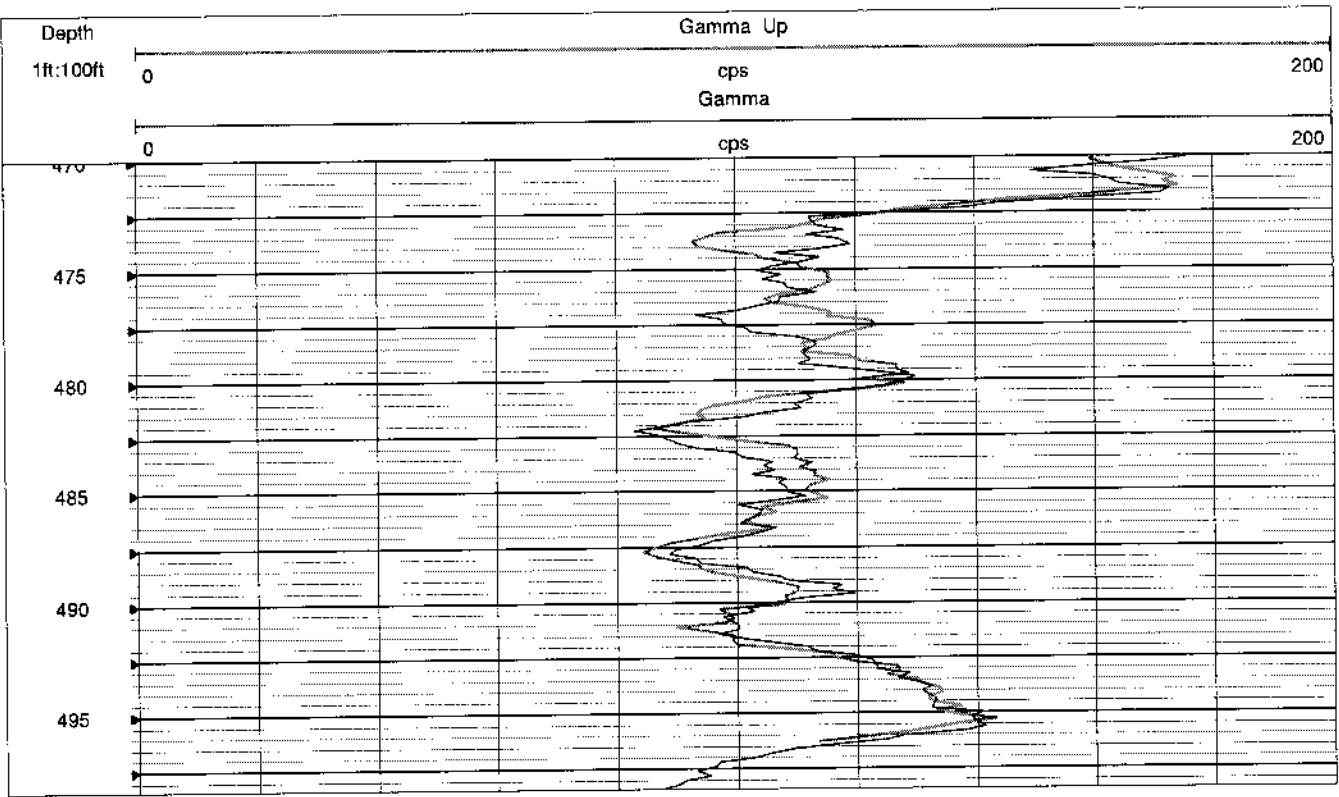














FMS ID: F175RES2

**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



**Department of
Design and
Construction**

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

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

New Construction of FDNY Firehouse for Rescue 2

LOCATION: 1815 Sterling Place
BOROUGH: Brooklyn, 11233
CITY OF NEW YORK

Contractor _____

Dated _____, 20____

Entered in the Comptroller's Office _____

First Assistant Bookkeeper _____

Dated _____, 20____

